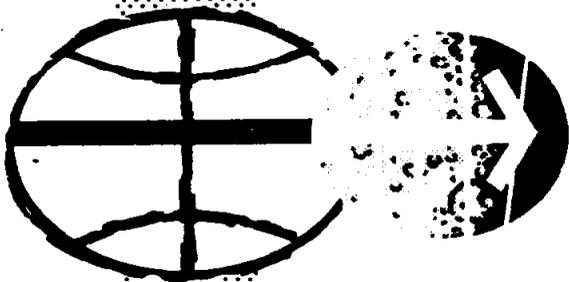




NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# Apollo 11 Spacecraft Commentary

July 16 - 24, 1969



MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS

APOLLO 11 MISSION COMMENTARY, 7/16/69 CDT 7:02, GET T-90 1/1

PAO This is Apollo/Saturn Launch Control T minus 1 hour 30 minutes 55 seconds and counting. All elements are GO with the countdown at this time, the countdown aimed at landing 2 astronauts on the Moon. At this time the spacecraft Test Conductor Skip Chauvin going through some checks with astronaut Mike Collins aboard the spacecraft. We're winding up this important emergency detection system test that Neil Armstrong has been participating in. Meanwhile, at the 320 foot level the closeout crew now placing the boost protective cover over the hatch now that we have completed the cabin purge and have the proper cabin environment inside the cabin. We have also performed leak checks to assure ourselves that the cabin atmosphere is valid. This boost protective cover is used during the early phases of a powered flight and it is jettisoned with the escape tower shortly after second stage ignition. Here in the firing room the launch vehicle test team's still keeping a close eye on the status of the propellants aboard the Saturn V launch vehicle. We're back to 100 percent supply with the liquid hydrogen fuel in the third stage. This problem with the leaking valve is no problem at this time. We've actually bypassed the valve that we are maintaining our hydrogen supply aboard the vehicle. All aspects GO, the weather is very satisfactory this morning, a thin cloud cover about 15 000 feet, temperature at launch time expected to be about 85 degrees. At T minus 1 hour, 29 minutes, ~~29~~ seconds and counting, this is Kennedy Launch Control.

END OF TAPE

APOLLO 11 MISSION CONTROL, 7-16-69, CDT 7:11, GET T-1:20 2/1

PAO This is Apollo/Saturn Launch Control T minus 1 hour, 20 minutes, 55 seconds and counting. All is still GO with the countdown for Apollo 11 at this time. At this point in the countdown Spacecraft Commander Neil Armstrong once again appears to be the busiest worker in the spacecraft as he is performing a series of alignment checks associated with the guidance system in the spacecraft. He is working these checks with the spacecraft test conductor as the test conductor reads out the various procedures and Armstrong responds to them. The astronauts aboard the spacecraft also were informed by the spacecraft conductor a short while ago that the launch vehicle is GO at this time. The hydrogen problem that we did encounter earlier has been solved. That is real good news said Armstrong and then he went back to work shortly thereafter. We are now coming up on the 1 hour, 20 minute mark in the countdown. This is Kennedy Launch Control.

END OF TAPE







PAO This is Apollo Saturn Launch Control. We've passed the 46-minute mark in our countdown. T minus 45 minutes, 52 seconds and counting. All elements still GO in the countdown at this time. The hard work on the spacecraft at this point in the countdown - Astronaut Buzz Aldrin in the middle seat. He's been working with the spacecraft test conductor on setting up proper switch settings in preparation for pressurizing the reaction control system. These are these big thrusters on the side of the service module. There's actually 16 of them in 4 quadrants around the service module. They are used for maneuvers in space. We pressurized that system before liftoff. That particular operation will be coming up in some 5 minutes or so. In preparation for it, Buzz Aldrin who has most of the switches in front of him has been preparing for that particular event. The launch vehicle people keeping an eye on the status of the various propellants aboard the Saturn V launch vehicle. Just at liftoff, we will have the vehicle weighing close to 6 and a half million pounds on the launch pad. There's more than a million gallons of propellants aboard the 3 stages of Saturn V. The report here in the control center are the propellants are stable. They did look a little while ago at the RP 1, the high-grade kerosene fuel that's used in the first stage of the Saturn V to make sure it was at its top level. We keep an eye on these various aspects throughout the count, and use the aid of computers to keep an overall look on general status. So now at T minus 44 minutes, 21 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo-Saturn launch control. We've passed the 41 minute mark in our count. T-40 minutes, 53 seconds and counting. We are continuing, and we're continuing very excellently at this time. There are no problems that have been reported in as the countdown continues to click down. We're still aiming for the start of our window on this, the first flight to land man on the moon. Our - we're aiming toward our planned liftoff time of 9:32 am eastern daylight time. Coming up shortly will be a key test here in the firing room. As far as the launch vehicle people are concerned, it's a - some final checks of the destruct system aboard the three stages of the Saturn-5 launch vehicle. In the event during powered flight that the vehicle strayed rather violently off course, the main safety officer could take action to destroy the vehicle which obviously would occur after the astronauts were separated by their escape tower from the faulty vehicle. We'll make a check of the destruct system to assure that if the signal is required to get through that, in fact, it will. This is what is coming up here in the control center at this time. All aspects of the mission still GO at T-39 minutes, 47 seconds and counting. This is Kennedy launch control.

END OF TAPE







PAO This is Apollo/Saturn Launch Control. We are now less than 16 minutes away from the planned liftoff for the Apollo 11 space vehicle. All still going well with the countdown at this time. The astronauts aboard the spacecraft have had a little chance to rest over the last few minutes or so. At least they have not been busy with procedures with the spacecraft test conductor. In the meantime we have been performing final checks on the tracking beacons and the instrument unit which is used as a guidance system during the powered phase of flight. Once we get down to the 3-minute and 10-second mark in the countdown, we'll go on an automatic sequence. As far as the launch vehicle is concerned all aspects from there on down will be automatic, run by the ground master computer here in the firing room. This will lead up to the 8.9-minute mark in the countdown when the ignition sequence will begin in those five engines of the first stage, the S-IC stage of Saturn V. At the 2-second mark we'll get information and a signal that all engines are running and at the zero mark in the countdown once we get the commit signal, the signal that says that the thrust is proper and acceptable, we then will get a commit and liftoff as the hold-on arms release the vehicle. We have some 7.6 million pounds of thrust pushing the vehicle upwards, a vehicle that weighs close to 6 and one-half million pounds. We are now 14 minutes and 30 seconds and counting and this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control. We've passed the 11-minute mark. Now T minus 10 minutes 54 seconds on our countdown for Apollo 11. All still GO at this time. The astronauts in the spacecraft busy again. The commander Neil Armstrong has performed some final switch settings for the stabilization and control system of the spacecraft. The spacecraft also now is on full internal power. This came shortly after the 15-minute mark. Spacecraft now on the full power of it's fuel cells. Up to this time, it had been sharing the load with an external power source. Both Armstrong and Buzz Aldrin have armed their rotational hand controllers - the controllers they use in flight and we have now gone to automatic system with the emergency detection system. That system - it would cue the astronauts if there's trouble down below with the Saturn V rocket during the powered flight. we're now coming up on the 10-minute mark. 10 minutes away from our planned liftoff. Mark T minus 10 minutes and counting, T minus 10. We're aiming for our planned liftoff at 32 minutes past the hour. This is Kennedy Launch Control.

END OF TAPE





PAO leading up to the ignition sequence 8.9 seconds. We are approaching the 60-second mark on the Apollo 11 Mission. T-60 seconds and counting. We have passed T-60. 55 seconds and counting. Neil Armstrong just reported back. It's been a real smooth countdown. We have passed the 50-second mark. Our transfer is complete on an internal power with the launch vehicle at this time. 40 seconds away from the Apollo 11 liftoff. All the second stage tanks now pressurized. 35 seconds and counting. We are still go with Apollo 11. 30 seconds and counting. Astronauts reported, feels good. T-25 seconds. 20 seconds and counting. T-15 seconds, guidance is internal, 12, 11, 10, 9, ignition sequence starts, 6, 5, 4, 3, 2, 1, zero, all engines running, LIFTOFF. We have a liftoff, 32 minutes past the hour. Liftoff on Apollo 11. Tower cleared.

PAO Neil Armstrong reporting their roll and pitch program which puts Apollo 11 on a proper heading. Plus 30 seconds.

SC Rolls complete and a pitch is program. One BRAVO.

PAO One BRAVO is an abort control mode. Altitude is 2 miles.

CAPCOM All is well at Houston. You are good at 1 minute.

PAO Down range 1 mile, altitude 3- 4 miles now, velocity is 2,195 feet per second. We are through the region of maximum dynamic pressure now. 8 miles down range, 12 miles high, velocity 4,000 feet per second.

CAPCOM Stand by for Mode 1 Charlie. MARK Mode 1 Charlie.

SC 1 Charlie.

PAO Cliff Charlesworth taking a staging status.

CAPCOM This is Houston, you are GO for staging.

SC Inboard cutoff.

PAO Inboard engines out.

CAPCOM Inboard cutoff.

PAO Down range 35 miles, 30 miles high. Standing by for the outboard engine shutdown now.

SC Staging and ignition.

CAPCOM 11, Houston, thrust is GO all engines, you are looking good.

SC Roger. Hear you loud and clear, Houston.

PAO At 3 minutes, downrange 70 miles,  
43 miles high, velocity 9300 feet per second.  
SC We've got skirts up.  
CAPCOM Roger, we confirm. Skirts up.  
SC Tower is gone.  
CAPCOM Roger. Tower.  
PAO Neil Armstrong confirming both  
the engine skirt separation and the launch escape tower  
separation.  
SC Houston be advised the visual is  
GO today.  
CAPCOM This is Houston. Roger, out.  
SC Yes, they finally gave me a window  
to look out.  
CAPCOM 11, Houston, your guidance is  
converged, you are looking good.  
PAO Downrange 140 miles, altitude is  
62 miles, velocity 10 300 feet per second.  
CAPCOM 11, Houston, you are GO at 4 minutes.  
SC Roger.  
PAO Apollo 11 right on the ground track.  
PAO 190 miles downrange now, 72 miles  
high, velocity 11 000 feet per second.  
PAO Booster says it is looking good at  
5 minutes.  
CAPCOM This is Houston, you are GO at  
5 minutes.  
SC Roger, Apollo 11, GO.  
PAO Downrange 270 miles, altitude is  
82 miles, velocity is 12 472 feet per second.  
CAPCOM S-IVB to COI capability.  
SC Okay.  
CAPCOM MARK S-IVB to COI capability.  
SC Roger.  
PAO Apollo 11 could now get into orbit  
using the S-IVB if necessary.  
SC - sitting in your living room.  
CAPCOM Oh, thank you. You are coming  
through beautifully, too.  
PAO Everyone is reporting GO here in  
the Control Center.  
SC - 6 minutes, starting the gimbal  
motors.  
CAPCOM Roger 11, you are GO from the  
ground at 6 minutes.

CAPCOM Apollo 11, this is Houston. Level sense arm at 8 plus 17, outboard cutoff at 9 plus 11.

PAO Level sense arm is the sequence that arranges the staging between the second stage and the third stage. The fuel - uncovers the sensor starting that sequence. Predicting that will be uncovered at 8 minutes 17 seconds with outboard engine cutoff at 9 minutes 11 seconds on the second stage.

SC Apollo 11 is good at 7 minutes.

CAPCOM Roger, 11, this is Houston. You are GO from the ground at 7 minutes. Level sense arm at 8 plus 17 outboard cutoff at at 9 plus 11.

SC Roger.

PAO Downrange 530 miles, altitude 95 miles, velocity 17 358 feet per second.

PAO Apollo 11 is still right down the ground track and still GO, at 7 minutes, 41 seconds.

CAPCOM Roger, we confirm.

PAO Inboard engines are out on the second stage as planned.

PAO Apollo 11 GO on all sources.

CAPCOM 11, Houston, you are GO at 8 minutes.

SC We just got the mixture ratio shift.

CAPCOM Roger, we've got PU shift down here, too.

SC It's a nice day for it. These thunderstorms downrange is about all.

CAPCOM 11, this is Houston. You are GO for staging. Over.

SC S-band, GO for staging.

CAPCOM Stand by for Mode IV Capability.

SC Mode IV.

CAPCOM MARK, Mode IV capability.

PAO Mode IV on Apollo 11 could get into orbit using the service propulsion system now. Altitude is 100 miles, downrange is 883 miles, outboard engine cutoff.

SC - and ignition.

CAPCOM Engine confirmed, thrust is GO, 11.

PAO And we have a good third stage now.

PAO Velocity is 23 128 feet per second. Downrange 1000 miles, altitude 101 miles.

CAPCOM Apollo 11, this is Houston, at 10 minutes you are GO.

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 8:16, GET T-1 15/4

SC Roger, 11, GO.  
PAO Capcom Bruce McCandless giving  
the reports here in the Control Center.  
CAPCOM Apollo 11, this is Houston, predicted  
cutoff at 11 plus 42. Over.  
SC 11 42. Roger.  
PAO Downrange 1175 miles, velocity  
24 190 feet per second and altitude 102 nautical miles.  
PAO Apollo 11 still GO on all sources.  
CAPCOM Apollo 11, this is Houston. You  
are GO at 11.  
SC Roger.  
PAO We are predicting third stage  
shutdown at 11 minutes, 42 seconds. Velocity 25 254 feet  
per second. Downrange 1400 miles now. Altitude 102.8  
nautical miles.  
SC Shutdown.  
PAO Shutdown right on time.  
SC 101.4 by 103.6  
CAPCOM Roger. Shutdown. We copy 101.4  
by 103.6.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/16/69, CDT 8:44, GET 12:04, 16/1

CAPCOM Apollo 11, this is Houston. You are confirmed GO.  
SC Roger.  
CAPCOM This is Houston. The booster is safe.  
SC Roger.  
PAO We show velocity and insertion 25 568 feet per second.  
CAPCOM Apollo 11, this is Houston. The booster has been configured for orbital coast. Both spacecraft are looking good. Over.  
SC Roger.  
CAPCOM Apollo 11, this is Houston. Vanguard LOS at 1535. AOS Canary at 1630. Over.  
SC Okay, thank you.  
PAO This is Apollo Control. Based on a vector from the instrument unit of the third stage of the Saturn V, here on the ground we're showing an orbit of 102.5 by 99.7 nautical miles. The flight dynamics officer, Dave Reed, wants to get some radar tracking to refine this orbit and he will report a refined orbit after more radar tracking.  
PAO This is Apollo Control at Canary Island Station. Has acquisition of Apollo 11 now. We'll continue to stand by live for any air to ground communication. We're showing an orbital weight of the combined vehicles of 297 914 pounds.  
COMM TECH Go ahead Houston Comm Tech, Canary Comm Tech.  
CAPCOM Apollo 11, this is Houston through Canary. Over.  
SC Roger, reading you loud and clear. Our insertion checklist is complete, and we have no abnormalities.  
CAPCOM Roger, and I'd like to pass up your DELTA azimuth correction at this time. Are you ready to copy?  
SC Stand by.  
SC Roger, go ahead. Ready to copy.  
CAPCOM Okay, DELTA azimuth correction is plus 0.22, that is plus .22 and we do recommend the P-52 alignment. Over.  
SC Okay, we'll go ahead with the P-52, and detecting angle plus 0.22.  
CAPCOM Roger, and your LOS time at Canary is 2337. Over.  
SC 2337.  
CAPCOM Houston, Roger. Out.  
PAO This is Apollo Control. Based on that initial orbital figures, the orbital period is 1 hour, 28 minutes, 16 seconds. This number will be refined also as we get better information on the orbit through radar tracking. At

APOLLO 11 MISSION COMMENTARY 7/16/69, CDT 8:44, GET 12:04, 16/2

PAO the present time, we're showing an orbital period of 1 hour, 28 minutes 17 seconds. We'll continue to stand by live through the Canary Station.

CAPCOM Apollo 11, this is Houston. One minute to LOS Canary. AOS at Tananarive, 3704 in VHF simplex ALPHA. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69 CDT 8:55 GET 00:23 17/1

CAPCOM Apollo 11, this is Houston, coming up on LOS Canary, AOS Tananarive at 3704, simplex ALFA. Houston out.

SC Roger.

PAO This is Apollo Control at 23 minutes 52 seconds. Canary Island station has loss of signal from Apollo 11. We have a tape of the air-ground during the launch phase. We'll play that for you now.

REPLAY OF LAUNCH TAPE

PAO This is Apollo Control at 36 minutes. That's the end of the tape. We have a report on the launch heart rates now from the flight surgeon. Commander Neil Armstrong's heart rate 110, Command Module pilot Mike Collins 99, Lunar Module pilot 88. These compare with their first Gemini flights, their first liftoff back in the Gemini program. Armstrong's heart rate was 146 at that time, Collins was 125, Aldrin was 110. We have acquisition at Tananarive now. We'll stand by live now through that station.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 00:38, CDT 9:10 am 18/1

PAO This is Apollo - -  
CAPCOM Apollo 11, this is Houston  
through Tananarive. Over. Apollo 11, Apollo 11, this is  
Houston through Tananarive. Over.  
SC Houston, Apollo 11. Read you  
on VHF radio system. How do you read? Over.  
CAPCOM Roger, 11. This is Houston.  
We're reading you loud and fairly clearly. For your informa-  
tion, Canary radar shows you in a 103.0 by 103.0 orbit. Over.  
SC Clear. Over.  
CAPCOM Roger. We can clear.  
SC Gene, we're just coming in to  
the terminator here.  
PAO This is Apollo Control. The  
orbital period at that 103 nautical mile circular orbit is  
1 hour, 28 minutes, 24 seconds.  
CAPCOM Apollo 11, this is Houston.  
One minute to LOS Tananarive. AOS Carnarvon is at 52:15.  
Over.  
SC All down, roger.  
PAO This is Apollo Control at 42 min-  
utes, 53 seconds. Tananarive has loss of signal. We'll come  
back up at 52 minutes into the mission when the Carnarvon-  
Australian station acquires Apollo 11. This is Mission  
Control, Houston.

END OF TAPE

PAO This is Apollo Control at 52 minutes and the station at Carnarvon, Australia is about to acquire Apollo 11. We'll stand by live for this pass.

CAPCOM Apollo 11, this is Houston through Carnarvon. Over.

SC Houston, Apollo 11. Loud and clear. Over.

CAPCOM Roger 11, we're reading you the same. Both the booster and the spacecraft are looking good to us. Over.

SC Houston, Apollo 11. Would you like to copy the alignment results?

CAPCOM That's affirmative.

SC Okay, NOUN 71 we used 30 and 37, 4 balls 1, NOUN 93 plus 00016 plus 00033 plus 00152. GET 00:48:15. Check star 34. Over.

CAPCOM Roger, say again check star.

SC Check star 34.

CAPCOM Roger, we copy, and the angles look good.

SC Tell Glenn Parker down at the Cape that he lucked out.

CAPCOM Understand tell Glenn Parker he lucked out.

SC Yes, he lucked out. He doesn't owe me a cup of coffee.

CAPCOM This is Houston. Roger. We'll pass it on.

PAO That was Buzz Aldrin giving the report and Mike Collins chiming in that at the last with the no cup of coffee report.

CAPCOM Apollo 11, this is Houston. 1 minute LOS Carnarvon, AOS at Honeysuckle 59:33. Over.

SC Apollo 11, roger.

CAPCOM Roger, request you turn up S-band volume for the Honeysuckle pass.

PAO This is Apollo Control. We've had loss of signal at Carnarvon. However, the station at Honeysuckle in Australia will acquire Apollo 11 in approximately a minute. We'll continue to stand by through the Honeysuckle pass.

CAPCOM Apollo 11, Apollo 11, this is Houston on S-band. Radio check, over.

SC Roger, Houston, Apollo 11 reads you loud and clear.

CAPCOM This is Houston. Roger, reading you the same. Out.

PAO That was Neil Armstrong in the radio check.

CAPCOM Apollo 11, this is Houston, a little over 1 minute to LOS at Honeysuckle. You'll be AOS at Goldstone at 1:29:02, LOS at Goldstone 1:33:55. Over.

SC Roger, Bruce, thank you. We expect TV

APOLLO 11 MISSION COMMENTARY 7/16/69 CDT 9:24 GET 00:52 19/2

SC We've got it all hooked up. We have not yet turned it on. We're ready to do that now.

CAPCOM Roger, we copy. We'll be configured and waiting for what ever you want to send out.

PAO This is Apollo Control at 1 hour 6 minutes into the mission of Apollo 11. Honeysuckle has lost signal. Mike Collins reported just prior to LOS here that the crew would check out the TV camera at the Goldstone station. Goldstone will acquire Apollo 11 at 1 hours 29 minutes 2 seconds and will lose the spacecraft at 1 hour 33 minutes 55 seconds. We'll come back up shortly prior to acquisition at Goldstone. This is Mission Control Houston.

END OF TAPE

PAO This is Apollo Control at 1 hour and 28 minutes into the mission. We are about 10 or 12 seconds away from acquisition at Goldstone at which time we expect a checkout of the color TV camera. We will then continue live through the United States pass.

CAPCOM (Garble)

SC Roger, Houston, read you loud and clear.

CAPCOM Roger. Reading you same, coming up on Goldstone.

SC Roger.

SC Cecil B. to Aldrin is standing by for instructions.

CAPCOM Houston, Roger.

PAO We have no downlink yet at Goldstone. We're standing by.

CAPCOM Apollo 11, this is Houston. We are not receiving your FM downlink yet. We are standing by.

CAPCOM Apollo 11, this is Houston. We are receiving your FM downlink now. We are standing by for TV modulations on the signal.

CAPCOM Apollo 11, Apollo 11, this is Houston on radio check. Over.

SC Roger. Loud and clear. We think we are transmitting to you.

CAPCOM Okay, we are not receiving it yet, 11, although we have confirmed presence of your FM downlink carrier.

SC Which switches do you want us to confirm?

CAPCOM Stand by.

CAPCOM Apollo 11, this is Houston. You were just on the fringes of coverage from Goldstone. We have just had LOS at Goldstone and we'd like to push on and get the pad messages read up to you here shortly.

SC Roger. We are ready to copy.

CAPCOM Apollo 11, this is Houston. I am ready with your TLI plus 90 minute abort test.

CAPCOM Apollo 11, this is Houston. I am ready with your TLI plus 90 minute abort test.

SC Apollo 11 is ready to copy TLI plus 90.

CAPCOM Roger. TLI plus 90, SPS G&N,

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 10:10, GET 1:18 20/2

CAPCOM 63481 minus 153 plus 132, CETI  
004102538, NOUN 81 minus 04761 plus 00001 plus 53361,  
ROLL 180 193 000. HA is NA plus 002035357363353349,  
Sextant Star 3352578122, the aboard sight star is not  
available. Latitude minus 02052 minus 02580 11887  
34345 0160350. GDC aline Vega and Deneb. ROLL 071291341  
no ullage undocks. I have your P37 for TLI plus 5 hours.  
Over.

SC Go ahead TLI plus 5.

CAPCOM Roger P37 format, TLI plus 5,  
00744 6485 minus 165 02506. Readback over.

SC TLI plus 90 SPS G&N 63481 minus  
153 plus 132 004 102538 minus 04761 plus 00001 plus  
53361 180 193 000. Not applicable, plus 00203 53573633  
53349331578122 not available, minus 0252, minus 0258  
1188734345 0160350. Vega and Deneb 071291 341. No  
ullage, undocked. P37 TLI plus 5.

END OF TAPE

SC 291341. No ullage undocked. P37 TLI plus 5. 00744 6485 minus 165 02506. Over.

CAPCOM Apollo 11, this is Houston. Readback correct. For your information Goldstone reports receiving approximately 1 minute of FM down link carrier. We were getting ready to request you confirm the S-band OCS switches, the S-band OCS tape switch to OFF and the S-band OCS TV switch to TV. Over.

SC I confirm that that is the configuration we're in.

CAPCOM Roger. Let us do a little more detective work here and see if we can come up with something.

SC Okay.

SC Houston, Apollo 11 is ready to go ahead with the - extend the docking probe, and ready to go with the RCS hot fire when you're ready to monitor. Over.

CAPCOM Roger, go ahead with the probe count.

SC Roger.

SC Okay, we're ready with the hot fire check when you're ready.

CAPCOM Roger, we're ready 11. Go ahead.

SC Roger, here's the pitch.

CAPCOM Apollo 11, this is Houston. We are seeing the pitch hot firing and it looks good.

SC Roger. Be advised that we are unable to hear them.

CAPCOM Roger, we copy.

SC Have you seen all 3 axis fire?

CAPCOM We've seen pitch and yaw, we've not seen roll today.

SC Okay, I'll put in a couple more rolls.

CAPCOM Okay, we've got the roll in focus and you're looking good here.

SC Roger. Houston, Apollo 11. We're standing by for a GO for sequence logic on.

CAPCOM Apollo 11, this is Houston. Go ahead and we'll watch on TM.

SC Okay. Sequence logic, 2 of them. Sequence logic 1 and 2 coming up and on them.

CAPCOM Apollo 11, this is Houston, you are GO for pyro arm.

SC Roger, thank you.

CAPCOM Apollo 11, this is Houston. If you will give us P00 in accept we have a state vector update for you.

SC Roger. You have P00 in accept.

CAPCOM Roger. It will probably be another 10 or 15 seconds. We're going to go up through the Vanguard. When you are ready to copy I have your TLI pad.

SC Roger, ready to copy TLI pad.

APOLLO 11 MISSION COMMENTARY 7/16/69 CDT 10:20 GET 1:38 21/2

CAPCOM Roger, TLI 235 14 179 071 001. Burn time  
547 104356 35575 Roll for sep 357107041 301 287 319. TLI  
10 minute abort pitch 223. Readback. Over.

SC Roger. TLI PAD. 23514 179071001 547 10  
4356 35575 357107041 301 287 319. TLI 10 minute abort  
pitch 223. Over.

CAPCOM Apollo 11, Houston. Roger. Would you  
read back DELTA-VC prime again? You were cut out by noise.

SC Okay. Roger, I'm picking up the squeal  
here, also. DELTA-VC 104356. Over.

CAPCOM Apollo 11, this is Houston. Readback  
correct. Out.

CAPCOM Apollo 11, this is Houston. We've completed  
the uplink, the computer is yours, you can go back to BLOCK.  
Would you verify that you have extended the probe? Over.

SC Roger, that's verified. The probe is  
extended.

CAPCOM Roger. About 2 minutes to LOS on this  
state side pass. AOS Canaries at 1:50:13. Over.

SC Roger, 1:50.

END OF TAPE

PAO This is Apollo Control. The tracking ship, Vanguard, has had loss of signal, however, the Canary Island station will acquire Apollo 11 in less than a minute. We'll continue to stay up live through the Canary station. The ignition time for the translunar injection burn - an elapsed time of 2 hours, 44 minutes, 14 seconds. Duration of the burn expected to be 5 minutes, 47 seconds. We're acquiring at Canaries now. We'll stand by.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger, Houston, Apollo 11. Loud and clear.

CAPCOM Okay, on your service module RCS quad BRAVO package temperature, we're showing it running a little low. Looks like about 20 degrees low - lower than the rest of the quad. Would you confirm that your RCS heater switch for quad BRAVO is in primary? Over.

SC You're correct. It was not in primary. It was off. It's on now. Thank you.

CAPCOM Roger, thank you.

PAO And the temperature on that reaction control system quad is coming up to normal now that the heater's on.

CAPCOM Apollo 11, this is Houston. Over.

SC Houston, Apollo 11. Go ahead.

CAPCOM Roger. We've checked over the spacecraft and the launch vehicle guidance. They're both looking to be in good shape. We estimate you have better than a 99 percent probability of a guidance cutoff on the launch vehicle, so things are apparently holding in very well. For your information, Mila received approximately 1 minute of a usable TV picture, so apparently the system is working, and you're a little over a minute from LOS at Canary. AOS Tananarive is 2 hours, 9 minutes, and 18 seconds. Over.

SC Roger. We like those 99 numbers. Thank you.

CAPCOM Roger, out.

PAO This is Apollo Control at 1 hour, 55 minutes into the mission. Canary has had loss of signal. We were unable to use the 1 minute of TV time from the mylar station. There is no longer a converter at Mila. The one formerly there has been sent to the Australian station. Tananarive will acquire Apollo 11 on its second orbit of the earth at 2 hours, 9 minutes, 18 seconds. We expect the translunar injection burn at 2 hours, 44 minutes, 14 seconds. Duration of 5 minutes, 47 seconds and the DELTA-V or the velocity that we will add to the spacecraft of 10,435.6 feet per second. We'll come back up at Tananarive acquisition. This is Mission Control, Houston.

END OF TAPE

PAO This Apollo Control at 2 hours, 8 minutes into the mission. Apollo 11 about to be acquired at the Tananarive station. As expected this orbit is changing slightly as the S-IVB third stage vents. We are showing an orbit now of 107 by 105.7 nautical miles in an orbital period of 1 hour, 28 minutes, 30 seconds. We have acquired Tananarive now. We'll stand by live through that station.

CAPCOM Apollo 11, this is Houston, through Tananarive. How do you read?

CAPCOM Apollo 11, this is Houston standing by through Tananarive.

COMM TECH Tananarive, Houston COMM TECH.

Net 1.

COMM TECH Tananarive, Houston, COMM TECH.

Net 1.

COMM TECH Goddard voice, Houston COMM TECH

Net 1.

GODDARD Goddard voice, read you loud and clear.

COMM TECH Roger, we can not raise Tananarive.

TAN Houston, COMM TECH, Tananarive.

COMM TECH Roger, Tananarive. Are you

receiving CAPCOM's voice and are you uplinking it?

TAN Negative.

COMM TECH Roger. Monitor again I'll tell CAPCOM to make one more transmission.

TAN Roger.

CAPCOM Apollo 11, Apollo 11, this is Houston standing by through Tananarive. Over.

SC Houston, Apollo 11.

CAPCOM Roger. Reading you loud and clear.

SC Houston, Apollo. The power is on.

CAPCOM This is Houston. Roger. Out.

CAPCOM Apollo 11, this is Houston.

1 minute to LOS Tananarive, AOS at Carnarvon, 22530.

SC Roger.

PAO This is Apollo Control at 2 hours, 16 minutes. Tananarive has loss of signal. The Carnarvon station will acquire at 2 hours, 25 and one-half minutes and during the Carnarvon pass the GO/NO GO decision will be made for the translunar injection maneuver. That maneuver to occur at about 27 minutes from now near the - spacecraft is near the Gilbert Islands, about halfway between Australia and Hawaii. We will come back up just prior to Carnarvon acquisition. This is Mission Control, Houston.

END OF TAPE

PAO This is Apollo Control at 2 hours 5 minutes and Carnarvon has acquired Apollo 11. At LOS here at Carnarvon we will have several ARIA's, Apollo Range Instrumented Aircraft, in the area between LOS Carnarvon and acquisition at the tracking ship Redstone, so we may have the capability of continuous communications between now and the TLI burn. We'll stand by through Carnarvon.

CAPCOM Apollo 11, this is Houston through Carnarvon.  
Radio check, over.

SC Roger, Houston through Carnarvon, Apollo 11,  
loud and clear.

CAPCOM Roger, you're coming in very loud and very  
clear here. Out.

CAPCOM Apollo 11, this is Houston, you are GO  
for TLI. Over.

SC Apollo 11, thank you.

CAPCOM Roger, out.

CAPCOM Apollo 11, this is Houston, over.

SC Houston, 11.

CAPCOM Roger. We'll be coming within range of  
the ARIA aircraft coverage here in about 1 minute. They're  
going to try uplinking both on S-band and on VHF this time,  
so if you'll make sure your S-band volume is turned up we'll  
appreciate it and we believe that we'll have continuous  
coverage from now on through this TLI burn. Over.

SC Very good.

CAPCOM Apollo 11, Apollo 11, this is Houston  
through ARIA 4. Radio check, over.

SC Houston, we read you strength 4 and a  
little scratchy.

CAPCOM Roger, we're reading you strength 5,  
readability 3, should be quite adequate.

CAPCOM Apollo 11, Apollo 11, this is Houston.  
We're reading you readability about 3, strength 5, sounds  
pretty good. Over.

SC Roger. We've got a little static in the  
background now.

PAO This is Apollo Control. We are 10 minutes  
away from ignition on translunar injection. We want to add  
10 435 feet per second to the spacecraft's velocity, looking  
for a total velocity at the end of this burn of about 35 575  
feet per second.

END OF TAPE

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CAPCOM Apollo 11, this is Houston through  
Aria 3, radio check, over.

SC Roger, Houston, Apollo 11, you are  
much clearer and adequately read. Over.

CAPCOM Roger, 11, you are coming in.  
5 by 5 here. Beautiful signal.

SC This is lot better than the static  
we had previously.

CAPCOM Okay.

SC And we got the time base fix indications  
on time.

CAPCOM This is Houston. Roger. Out.

CAPCOM Apollo 11, this is Houston. WE  
just got telemetry back down on your booster and it is  
looking good.

SC Roger. It looks good here.

CAPCOM Houston, Roger, out.

PAO This is Apollo Control. We are  
2 minutes from ignition now. We are showing present  
altitude of about 108 nautical miles. We expect to be in  
an altitude of 177 nautical miles at cutoff. The present  
velocity is 25 560 feet per second. We are one minute  
from ignition.

CAPCOM Apollo 11, this is Houston, slightly  
less than 1 minute to ignition and everything is GO.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 11:15, GET 2:43 26/1

PAO and we're one minute from ignition.  
CAPCOM Apollo 11, this is Houston. we are  
slightly less than one minute to ignition and everything is  
GO.

SC Roger.  
SC Ignition.  
CAPCOM We confirm ignition and thrust is  
GO.

PAO Guidance looking good. velocity  
26 000 feet per second  
CAPCOM Apollo 11, this is Houston at 1 minute.  
Trajectory and guidance look good and the stage is good. Over.  
SC Apollo 11. Roger.  
PAO Coming up on 27 000 feet per second.  
PAO Telemetry and radar tracking both  
solid. Velocity 27 800 feet per second.  
CAPCOM Apollo 11, this is Houston. Thrust is  
good. Everything's still looking good.

SC Roger.  
PAO We're 2 and a half minutes into this  
burn. Still have another 3 minutes to go.

PAO And velocity exceeds 29 000 feet per  
second building up toward 30 000 feet per second.  
PAO Present altitude 115 nautical miles.  
CAPCOM Apollo 11, this is Houston. Around  
3 and a half minutes. You're still looking good. Your  
predicted cutoff is right on the nominal.

SC Roger. Apollo 11's GO.  
PAO 31 200 feet per second now. Altitude  
125 nautical miles.  
PAO Velocity 32 000 feet per second. Al-  
titude 130 miles.  
PAO One minute left to burn. Velocity  
is 33 000 feet per second. Altitude 142 and a half nautical  
miles  
CAPCOM Apollo 11, this is Houston. You are  
GO at 5 minutes.

SC Roger, we're GO.  
PAO 34 000 feet per second now. Altitude  
152.  
PAO 35 000 feet per second.  
PAO Cut out. We're showing velocity  
35 570 feet per second. Altitude 177 nautical miles.  
CAPCOM Apollo 11, this is Houston. we show

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 11:15, GET 2:43, 26/2

CAPCOM cutoff and we copy the numbers in  
noun 62.  
CAPCOM Apollo 11, Houston, do you read?  
CAPCOM Apollo 11, this is Houston. Do you  
read? Over.  
SC Roger, Houston. Apollo 11. We're  
reading the VIL 35579 and the EMS was plus 3.3. Over.  
CAPCOM Roger. Plus 3.3 on the EMS. And we  
copy the VI.  
SC Hey Houston, Apollo 11. This Saturn  
gave us a magnificent ride.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69 CDT 11:25 GET 2:53 27/1

SC Houston, Apollo 11. The Saturn gave  
us a magnificent ride.  
CAPCOM Roger, 11, we'll pass that on, and it looks  
like you are well on your way now.  
PAO That was Neil Armstrong praising the  
launch vehicle.  
SC We have no complaints with any of the  
3 stages on that ride. It was beautiful.  
CAPCOM Roger, no transients at staging of any  
significance. Over.  
SC That's right, it was nominal. All a good  
ride.  
CAPCOM Houston, roger, out.  
CAPCOM Apollo 11, this is Houston. For your  
information we expect the maneuver to separation attitude  
to begin at 3 plus 05 plus 03, and to be completed plus  
09 plus 20. Separation at 3 plus 15 plus 00.  
SC Roger, time to begin maneuver is 30503,  
complete 30920. Separation 3 plus 1500.  
CAPCOM Roger, that separation should be 3 plus  
15 03, my error in reading up.  
SC Roger.  
PAO This is Apollo Control, velocity falling  
off now. Immediately after shutdown we're showing 34 000  
feet per second now. The altitude building 512 nautical  
miles.  
CAPCOM Apollo 11, this is Houston. All the booster  
functions are proceeding normally. The sequencing is in good  
shape, and it doesn't look like you are having any problems  
at all. Over.  
SC Roger.  
PAO This is Apollo Control and we're showing  
orbital weight 138 892.9 pounds.  
PAO This is Apollo Control at 3 hours into  
the mission. Velocity now 31 214 feet per second. Apollo 11's  
distance from Earth 1245 nautical miles.

END OF TAPE

CAPCOM Apollo 11, this is Houston. Preliminary data indicates a good cutoff on the S-IVB. We'll have some more trajectory data for you in about half an hour. Over.

PAO This is Apollo Control. The S-IVB has started its maneuvering to the separation attitude.

PAO At 3 hours 7 minutes the velocity is 27 945 feet per second. Distance from Earth 2384 nautical miles.

CAPCOM Apollo 11, Apollo 11, this is Houston, over.

CAPCOM Apollo 11, Apollo 11, this is Houston, over.

SC Hello Houston. Hello Houston. This is Apollo 11. I'm reading you loud and clear. Go ahead, over.

CAPCOM Roger, 11, this is Houston. We had to shift stations. We weren't reading you through Goldstone. We show pyro bus A armed and pyro bus B not armed at the present time. Over.

SC That's affirmative, Houston, that's affirmative.

CAPCOM Roger.

PAO The S-IVB has completed its maneuver to separation attitude.

PAO 4 minutes away from separation, 4 minutes.

PAO At 3 hours 11 minutes into the mission velocity 26 314 feet per second. Distance from Earth 3140 nautical miles.

PAO The S-IVB is reported in a stable attitude for the separation.

PAO Rates are less than 1/10th of a foot per second in all axis.

END OF TAPE

PAO One minute to separation.  
CAPCOM Apollo 11, this is Houston.  
You're GO for separation. Our systems recommendation is  
arm both pyro busses. Over.  
SC Okay. Pyro B coming armed. My  
intent is to use bottle primary 1, as per the check list  
therefore I just turned A on.  
CAPCOM Roger, we confer with the logic.  
PAO We're waiting confirmation of  
separation.  
SC Houston, we're about to SEP.  
CAPCOM This is Houston. We copy.  
SC Separation complete.  
CAPCOM Roger.  
PAO We confirm the separation here  
on the ground.  
SC And (garbled) secondary propellant  
B went (garbled).  
CAPCOM That was secondary propellant  
on quad BRAVO?  
SC Quad BRAVO, yes. Both the primary  
and secondary (garbled).  
SC Houston, stand by.  
CAPCOM Apollo 11, this is Houston.  
Radio checkover.  
PAO The Goldstone station reports  
a very weak signal. We believe that (garble) is now maneuvering  
the spacecraft in the transposition and docking maneuver, and  
the antenna patterns aren't too good at the moment, so we  
have a weak signal strength.

END OF TAPE

CAPCOM Apollo 11, Apollo 11, this is Houston  
broadcasting in the blind. Request OMNI BRAVO is you read us.  
request OMNI BRAVO. out.

CAPCOM Apollo 11, this is Houston. How do you  
read?

PAO Goldstone still showing weak signal  
strength.

CAPCOM Apollo 11, this is Houston. How do you  
read? Over.

CAPCOM Apollo 11, Apollo 11, this is Houston.  
Do you read? Over.

CAPCOM Apollo 11, this is Houston. Radio check.  
Over.

CAPCOM Apollo 11, this is Houston. Radio check.  
Over.

CAPCOM Roger, we've copying you about 5 by 2, very  
weak. Can you give us a status report, please?

SC Roger, we are docked and we do want  
acquisition with the high gain at this time I think.

CAPCOM Understand you are using the high gain,  
over.

SC That's affirmative.

CAPCOM Roger, I read you very loud and clear, Buzz.  
Mike is pretty weak.

SC Roger, we've got the high gain locked on  
now I believe, auto tracking now.

CAPCOM Okay, you're coming in loud and clear but  
Mike is just barely readable.

SC That was Neil. How are you reading Mike.

CAPCOM Loud and clear, Mike, and we understand  
that you are docked.

SC That's affirmative.

SC Houston, CDR. How do you read (garbled).  
11, CDR loud and clear, Neil.

SC Okay.

PAO This is Apollo Control. Apollo 11's  
velocity now 21 096 feet per second, distance from Earth  
6649 nautical miles.

CAPCOM 11, this is Houston. Over.

SC Houston, Apollo 11. Go ahead.

CAPCOM Roger, when you commented on that BRAVO  
problem at separation you were a little weak. Could you go  
through what you did after you noticed the talkback problem  
again, please?

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 3:33, CDT 12:05 31/1

CAPCOM We copied the - the primary  
and secondary propellant tank back on SM RCS quad BRAVO 1  
to barberpole at separation.

SC Roger. Roger, that's affirmative,  
and we moved that switch to the open position and they went  
back to gray. Over.

CAPCOM Roger.

PAO This is Apollo Control. We're  
34 minutes away from extraction of the Lunar Module from its  
adapter in the third stage of the saturn. The crew has started  
pressurizing the LM.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger, Houston. Apollo 11, go  
ahead.

CAPCOM Roger. Could you give us comments  
on how the transposition and docking was? Over.

SC I thought it went pretty well,  
Houston. Although I expect I used more gas than I've been  
using in the simulator. The turn around maneuver, I went  
pitch accel command and started to pitch up, and then when  
I started to pitch up, and then when I put manual attitude  
pitch back to rate command for some reason it - it stopped  
its pitch rate, and I had to go back to accel command and  
hit what I thought was an extra proceed on the DSKY. And  
during the course of that we drifted slightly further away  
from the S-IV B than I expected. I expected to be out about  
66 feet. My guess would be I was around 100 or so, and there-  
fore I expect I used a bit more coming back in. Except for  
using a little more gas, and I've used a few numbers on that  
everything went nominally.

CAPCOM This is Houston. We copy.

PAO That was Mike Collins giving  
the description on the transposition and docking.

END OF TAPE

SC Apollo 11. Over.  
CAPCOM Go ahead 11.  
SC Bruce, we're working on the pressurization of the LM now and working off the decal with the SM LM pressure equalization. And we're down to step 13 where we're waiting for the cabin pressure to be 5 or should be roughly 5 before we turn the repress package 02 valve to FILL. Instead of 5, we're running about 4.4. Over.  
CAPCOM Roger. Stand by a second.  
SC Houston, Apollo 11. We just put the repress package 02 valve to FILL. Momentarily there at step 13 and we have filled the bottles back up partially. What's the pressure reading on them?  
SC We have about 450 PSI in the 3 1-pound bottle.  
CAPCOM Roger. Stand by a second please.  
SC Roger, standing by. The repress valve is now in the OFF position. What's the cabin pressure now Buzz? Cabin pressure is now 4.5.  
PAO At 3 hours, 46 minutes, velocity is 18 917 feet per second. Distance from Earth 9002 nautical miles.  
SC Houston, Apollo 11. We think these readings are in normal tolerance and we just wanted to get your concurrence before we press down any further with these decals.  
CAPCOM Okay, captain.  
SC Houston, Apollo 11. How do you read?  
CAPCOM Apollo 11, this is Houston. Go ahead.  
SC Roger. LM looks to be in pretty fine shape from about all we can see from here.  
CAPCOM Okay, and in reference to your question on this step 13 on the decal, I understand that you have used up the contents of the repress 02 package and at that time, instead of being up to 5 PSI, you were reading 4.4. Is that correct?  
SC I said 4.4, yes sir.  
CAPCOM Okay, and you want to know if you can go ahead and use additional oxygen to bring the command module up to 5.0 and continue the equalization? Over.  
SC Yes. We think it's within normal balances Bruce. We just wanted to get your concurrence before we press nominal procedure.  
CAPCOM Roger, Apollo 11. Go ahead.  
SC Okay, we pressed nominal procedure.  
CAPCOM And 11, Houston. We have a request for you on the service module secondary propellant fuel pressurization valve. As a precautionary measure, we'd like you to momentarily cycle the 4 switches to the close position and then release. As you know we have no TM or talkback on these

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CAPCOM Valve positions and it's conceivable that one of them might also have been moved into a different position by the shock of separation. Over.

SC Okay, good idea. That's being done.

CAPCOM Houston, roger. Out.

CAPCOM Apollo 11, Houston. We're doing a non-propulsive vat on the booster at the present time. You may see some sort of a cloud coming out of it. When you're ready I have your evasive maneuver pad.

SC Roger. It's coming out.

CAPCOM Roger, out.

SC It's a haze. It's going by toward our minus X direction and several small particles are moving along with it. A natural velocity is fairly high - at least it appears to be high. And we've got a 02 high - right now.

CAPCOM Houston, roger. Out.

END OF TAPE

SC And, Houston, you might be interested that at my firsthand window right now, I can observe the entire continent of North America, Alaska, over the Pole, down to the Yucatan Peninsula, Cuba, northern part of South America and then I run out of window.

CAPCOM Roger. We copy.

PAO That was Neil Armstrong with that report.

SC Houston, Apollo 11. All 12 latches are locked.

CAPCOM Roger, 11, this is Houston. Understand. 12 latches locked.

PAO That was Buzz Aldrin reporting that all 12 of the latches in the docking mechanism had locked.

CAPCOM 11, Houston. Whenever you possess a free moment there, we've got this Evasive Maneuver Pass.

SC Roger.

SC Go ahead, Houston, Apollo 11 ready to copy.

CAPCOM Apollo 11, this is Houston. Evasive Maneuver SPS G&N 63481 plus 095 minus 020. GETI 004 40 01 00 plus 000 51 plus all balls, plus 00190, ROLL is your option, PITCH 213 357 NOUN 44 is NA, DELTA VT is 00 197 003 00152. The rest of the pad is NA. No ullage, LM weight 33 290. Readback. Over.

CAPCOM Apollo 11, this is Houston. Standing by for your readback. Over.

CAPCOM 11, Houston, do you read? Over.

CAPCOM Apollo 11, this is Houston. Do you read? Over.

SC All of a sudden there, we had a little click and the signal strength began to start dropping off. Your transmissions were cut off very abruptly. How do you read now?

CAPCOM Roger. Loud and clear. We had a handover to Madrid about the time I was halfway through the pad. If you could give me the last value you read, I'll pick up there. Over.

SC Okay, back with DELTA VZ. Over.

CAPCOM Roger. DELTA VZ is plus 00190, ROLL, your option, PITCH 213 357 and NOUN 44 is NA.

END OF TAPE

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CAPCOM Roll, your option. Pitch 213357 NOUN  
44 is NA. DELTA-VT 00197 00300152. The rest of the pad  
is NA, and no ullage. LM weight 33 290. Read back. Over.  
SC Roger, Houston. Evasive maneuver SPS  
G&N. 63481 plus 095 minus 020 00440 0100 plus 00051 plus  
all zeros plus 00190. Roll crew option, 213357 NA 00197  
003 00152 No ullage. LM weight 33290. Over.  
CAPCOM 11, this is Houston. Readback correct, out.  
PAO This is Apollo Control at 4 hours 4 minutes  
Apollo 11's velocity now is 17 014 feet per second. Its  
distance from Earth 11 753 nautical miles. We're about  
5 minutes away from ejection of the lunar module and about  
35 minutes away from this evasive maneuver. Ignition time  
on the evasive maneuver ground elapsed time of 4 hours 40 min-  
utes 1 second. It will be a service propulsion system burn  
of 3 seconds duration DELTA-V 19.7 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 4:13, CDT 12:45 35/1

SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC We'd like to arm our logic  
switches.  
CAPCOM Go ahead with the logic.  
SC Okay, mark logic 1 and 2 armed.  
CAPCOM Roger, we show the logic armed,  
and you're GO for pyro arm.  
SC Houston, we're ready for LM  
ejection.  
CAPCOM Roger, you're GO for LM ejection.  
SC Thank you.  
SC Houston, we have sep. We have a  
cryo press. light.  
CAPCOM Roger, copy. Cryo press. light.  
CAPCOM Roger, 11. We recommend you  
turn the O2 fans on manually and insure that the O2 heaters  
are in the automatic position.  
SC Roger. O2 heaters are on, and  
we're going to cycle the O2 fans now.  
CAPCOM Roger, O2 heaters to AUTO, or  
you can watch them in the ON position and O2 fans manual ON.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 12:55, GET 4:23 36/1

CAPCOM Apollo 11, this is Houston. Over.  
SC Here it is now, Apollo 11.  
CAPCOM Roger. In answer to your question  
on RCS usage, it looks like you are 18 or maybe 20 pounds  
below nominal at the present time. No problem at all. Over.  
SC Great.  
SC Wanted to be 18 or 20 pounds  
above nominal.  
CAPCOM Sorry about that.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 4:33, CDT 13:05 37/1

PAO This is Apollo Control at 4 hours, 34 minutes. Apollo 11's velocity is 14,972 feet per second. Its distance from earth is 15,895 nautical miles. The spacecraft weight 96,760.9 pounds. We're about 5 minutes away from a evasive maneuver - that one I'm sure there will be no problems of recontact between the spacecraft and the SIVB stage of the launch vehicle.

CAPCOM 11, Houston. Your systems are looking good. We're standing by for the burn.

PAO The duration of this burn will be 3 seconds. DELTA-V 19.7 feet per second. Ignition, shut-down.

SC Houston, Apollo 11. Could you confirm that pitch gimbal motor number 1 turned off? We just shut all four off, and we got a questionable indication on the ECS on pitch 1.

CAPCOM Roger. Stand by a second. Apollo 11, this is Houston. Stand by, please.

SC Go ahead, Houston. Did you copy our residuals?

CAPCOM Roger. We got 00 and .2 it looks like.

SC We had .1 while ago. It's just like the .2.

CAPCOM Okay.

SC That EMS DELTA-V counter is minus 4.0. CAPCOM Minus 4.0. Roger.

SC And how about pitch gimbal 1? Can you confirm that off?

CAPCOM Can you stand by just a second on that? At the present time we cannot confirm it off. We saw a current drop indicating that several motors had gone off. We'll be back with you in just a second on it. Over.

SC Okay. If necessary we can recycle it.

CAPCOM Apollo 11, this is Houston. If you'll go ahead and cycle pitch gimbal motor number 1 on and then off and give us a mark, and we'll tell you what we see. Over.

SC Okay, fine. It's coming back on. Ready, MARK. And it's going back off. Ready, MARK. And that time we had an onboard indication, Houston. Thank you alot.

CAPCOM Roger. We confirm that it is off.

SC We do likewise.

PAO This is Apollo Control at 4 hours, 44 minutes. A news conference at Kennedy Space Center is

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 4:33, CDT 13:05 37/2

PAO about to begin. We will take down the live circuits and tape air to ground during this news conference and play it back after the conference. This is Mission Control, Houston.

END OF TAPE

PAO This is Apollo Control at 5 hours, 11 minutes into the mission. The S4B slingshot maneuver was completed about 5 minutes ago. Designed to put the third stage of the launch vehicle into a trajectory that will take it behind the trailing edge of the moon and then into a solar orbit. The crew did not witness this maneuver. The command was not in the proper attitude where they could see the S-IVB at the time. We've advised the crew that we do not believe that we'll do the first midcourse correction. That we'll wait for midcourse correction 2 tomorrow and expect a DELTA V to be performed in that maneuver of about 21.3 feet per second. We've also had some other brief transmissions including a - comments from Neil Armstrong on the view out the window, and a weather report on the part of the world he can see. We have the tape of these transmissions that have occurred during the news conference at the Cape. We'll play that for you now and catch up live.

SC Houston, Apollo 11. We're starting our maneuver to observe the S-IVB slingshot.

CAPCOM Roger, 11. We've got an updated attitude for you on the slingshot observation.

SC Okay, say the angles please.

CAPCOM Roger. ROLL 002.5, PITCH 289.3, YAW 357.5 and there's also an update - minor correction to your attitude for the P-52. Over.

SC Roger. I have ROLL 2.5, PITCH 289.3, and YAW 357.5. Over.

CAPCOM Roger. And for your P-52 and optics calibration it'll be ROLL 346.5, PITCH 345.0, and YAW 007.8. Over.

SC Roger. 346.5, 345.0, and 7.8. Thank you.

CAPCOM Houston, roger. Out.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger, go ahead Houston. Apollo 11.

CAPCOM Roger. We're going to go ahead and observe the S-IVB for the slingshot maneuver. The LOX dump will start about 12 minutes from now. Over.

SC Okay, LOX dump about - I guess that'll make it about 01.

CAPCOM Right. I'll try to give you a little closer update as we approach it.

SC Alright.

CAPCOM 11, for your information, the magnitude of midcourse correction number 1, if we've burned it, looks like about 17 feet per second. We're presently considering not burning it. This could make midcourse correction 2 tomorrow about 21.3. Over.

SC That sounds good to us.

CAPCOM Roger, you're looking good down here.  
SC Well, we didn't have much time, Houston, to talk to you about our view out the window, so when we were prepared for lunar injection, but up to that time, we had the entire northern part of the lighted hemisphere visible including North America, North Atlantic, and Europe and Northern Africa. We could see that the weather was good just about everywhere. There was one cyclonic depression in Northern Canada, in the Athabaska - probably east of Athabaska area. Greenland was clear and it appeared to be we were seeing just the icecap in Greenland. All North Atlantic was pretty good, and Europe and Northern Africa seemed to be clear. Most of the United States was clear. There was a low - looked like a front stretching from the center of the country up cross north of the Great Lakes and into Newfoundland.

CAPCOM Roger, we copy.  
SC I didn't know what I was looking at, but I sure did like it.

CAPCOM Okay. I guess the view must be pretty good from up there. We show you just roughly somewhere around 19 000 miles out now.

SC I didn't have much outside my window.  
CAPCOM We'll get you into the PTC one of these days, and you can take turns looking.

SC Houston, Apollo 11. We've completed our maneuvers to observe the slingshot attitude, but we don't see anything - no Earth and no S4B.

CAPCOM Roger, stand by. In GET I have a LOX dump start time for you. It's supposed to start at 5 plus 03 plus 07 and stop at 5 plus 04 plus 55. LH burn starts at 5 plus 37 plus 47. Stop at 5 plus 42 plus 27. Over.

SC Roger, thank you.  
CAPCOM 11, Houston.

SC Go ahead Houston.  
CAPCOM Roger. We now recommend the following attitudes: ROLL 307.0, PITCH 354.0, YAW 019.5, and the LOX dump has already been enabled so we can't hold it off any longer.

SC That's okay, go ahead. We'll maneuver around to 307, 354, and 19 and a half.

CAPCOM Roger.  
CAPCOM 11, Houston. It doesn't look to us like you'll be able to make it around to this observation attitude in 2 minutes. We recommend that you save the fuel. Over.

SC Okay, Houston. You got to us just a little late. Our maneuver's already begun, so it's going

SC to cost us about the same amount of fuel to stop it no matter where we stop it and we may as well keep going.

CAPCOM Roger, go ahead.

CAPCOM 11, Houston. LOX dump initiated.

CAPCOM 11, Houston. LOX dump has been terminated. Over.

SC Roger. We still don't have the -

CAPCOM Roger, out.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger, if you'll give us ACCEPT and stay in POO, we'll set your trunnion bias to 0 and I have a plan for balancing your oxygen cryo's. Over.

SC You got it.

CAPCOM Roger.

SC Houston, Apollo 11. We've got the - what appears to be the S4B in sight - oh it has to be a couple of miles away. It's at our number 5 window and the dump appears to be coming out of 2 radially opposite directions from the S4B.

CAPCOM Roger. they're continuing with the non-propulsive vent from a liquid oxygen tank. It would be radially opposite then. And boosters tell me it's the continuous vent system they're also dumping a small amount of fuel at this time. We've got about 23 and a half minutes or so until the APS burn. Over.

SC Roger.

CAPCOM 11, Houston. We have our recommended configuration for your cryo switches to even up the load between oxygen tanks 1 and 2. Over.

SC (inaudible)

CAPCOM Okay, you're coming in very weakly there. We're recommending O2 tank 1 heater off, O2 tank 2 heater to AUTO, O2 tanks 1 and 2 fans both OFF, H2 tank 1 heaters to AUTO, and H2 tank 2 heaters to OFF. Over.

SC Roger, we have that except the last one was H2 fans to OFF. Is that affirmed?

SC The configuration we have now is hydrogen heaters, we got 1 AUTO, 2 OFF, oxygen heaters 1 OFF, 2 AUTO, and we have all the fans OFF.

CAPCOM This is Houston. Roger, we concur. Out.

CAPCOM 11, this is Houston. We've completed the trunnion zero bias setting. We can retrieve the computer and go to BLOCK.

SC Roger, and I thank you.

CAPCOM 11, this is Houston. With this maneuvering to observe the slingshot, I guess we missed copying your LM CM DELTA P reading. Over.

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 13:43, GET 5:11, 38/4

SC Stand by, we'll give you a reading.  
CAPCOM Okay, roger.  
SC Right now reading 0.2 Bruce.  
CAPCOM Roger, 0.2. Okay, Mike, and could  
you verify that your waste compartment valve is in VENT  
then?  
SC Roger, waste compartment valve has  
been in VENT for oh I guess 45 minutes or so.  
CAPCOM Roger, we copy.  
SC If we're late in answering you, it's  
because we're munching sandwiches.  
CAPCOM Roger. I wish I could do the same  
here.  
SC don't leave the console.  
CAPCOM Don't worry. I won't.  
SC Frank doesn't like it.  
SC How is Frank today?  
CAPCOM Oh he's doing quite well.  
PAO This is Apollo control at 5 hours 22  
minutes. We're back live now. The Delta-P you heard discussed  
is the difference in pressure, between the LM and the  
command module, the cabin pressure. Apollo 11, coming up on  
22 thousand miles distance from the earth now. Velocity,  
12 thousand 9 hundred 14 feet per second.

END OF TAPE

SC Houston, 11.  
CAPCOM Go ahead, 11.  
sc Down in the control center you  
might want to join us in wishing Dr. George Mueller a  
happy birthday.

CAPCOM Roger. We are standing by for your  
birthday greetings.

SC I think today is also the birthday  
of California and I believe they are 200 years old and we  
send them a happy birthday. It's Dr. Mueller's birthday  
also but I don't think he is that old.

CAPCOM Roger. We copy and looking back  
in the viewing room right now. I don't see him.

SC He may not be back from the Cape  
yet.

CAPCOM Roger. I believe Dr. Mueller is  
on his way back from the Cape. We will relay his greetings  
for you.

SC Roger.

CAPCOM 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM Roger. At your convenience, we  
would like to get a waste water dump to 5 percent remaining.  
After completion of this one the next waste water dump  
will be at about GET equal to 25 hours. Over.

SC Coming on right now.

CAPCOM Roger.

PAO This is Apollo Control at 5 hours,  
31 minutes into the mission. Apollo 11's velocity now  
is 12 637 feet per second. Distance from earth 22 971  
miles. Spacecraft weight is 96 573 pounds.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 5:33, CDT 14:05 40/1

SC Houston, Apollo 11. Do you copy  
our torquing angles?  
CAPCOM Would you leave them on there  
for another second, please?  
SC Will do.  
CAPCOM 11, this is Houston. We copy  
the angles, but stand by before you go ahead and use them.  
Over.  
SC Standing by.  
CAPCOM Wait a minute, Houston. We request  
that you redo P52 and if the angles come out the same magnitude  
go ahead and incorporate them. Over.  
SC Okay, will do.  
CAPCOM They look a little large right  
now.  
SC Yes, roll - roll looks a little  
large especially there.  
CAPCOM Roger.  
CAPCOM We showing a waste water quantity  
of about 13 percent on TM now, 11. Over.  
SC Roger. It's off now.  
CAPCOM Roger. We copy.  
SC Houston, Apollo 11. Torquing  
angles essentially the same, and we're going to go ahead and  
torque them now.  
CAPCOM Roger. We concur.  
SC Okay.  
CAPCOM Apollo 11, this is Houston. Could  
you give us a - an auto optics check to a third star or a  
different star from the one you've been using?  
SC Sure, be glad to. I can go back  
and do the whole thing and pick different stars.  
CAPCOM I don't think there - there's  
any need to do that. We'd just like to confirm it with a  
different star. That roll angle was a little larger than  
we expected.  
SC Okay.  
CAPCOM Apollo 11, Houston. I have a  
TLI plus 11 hour pad when you're ready to copy.  
SC Wait one.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 14:15, GET 5:43 41/1

SC Old Star No. 30 looks like it  
is right dab smack in the middle of the Sextant.  
CAPCOM Houston, Roger. Out.  
SC 11, ready to copy.  
CAPCOM Roger, 11. This is the TLI plus 11  
hours, P-37 format. 013444793 minus 165 049 23. Readback.  
Over.  
SC Roger. 1344 4793 minus 165 04923.  
Over.  
CAPCOM This is Houston. Readback correct.  
Over.  
PAO This is Apollo Control at 5 hours,  
55 minutes. Apollo 11's velocity is 11 970 feet per second.  
Distance from earth is 25 671 nautical miles.  
SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Did you have any update for the  
ROLL, PITCH and YAW angles on the top of Page 37 in the  
flight plan, or are they still good?  
CAPCOM That's for the optics calibration?  
SC Yes, Sir.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 14:30, GET: 5:58 42/1

SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Roger, do you have any update for the  
roll, pitch, and yaw angles on the top of page 3, 7 on the  
flight plan, or are they still good?  
CAPCOM That's for the optics calibration.  
SC Yes, sir.  
CAPCOM Yes, indeed. I'll give them to you  
in just a second here. Roger, 11, for the optics calibration  
I've got 346.5 for roll, 345.0 for pitch, and 007.8 for yaw.  
The pen and ink attitude corrections in your book are good,  
over.  
SC Okay.  
CAPCOM And we're going to hand over to  
Hawaii in about 5 or 6 seconds. Here we'll have a momentary  
comm dropout.  
SC Roger.  
CAPCOM Hello, Apollo 11, Houston. Be advised  
your friendly white team is - come on for it's first shift,  
and if we can be of service, don't hesitate to call.  
SC Thank you very much. Yeah, we're  
about to take our marks, Charlie, and it's B23 optics cal.  
I've got it in the sextant now, and I'm about to split the  
image and mark.  
CAPCOM Roger, Mike, we'll watch it.  
PAO The Cap Com is now Charlie Duke, and  
Gene Kranz and his white team of flight controllers is preparing  
to take over the responsibility here in the Control Center from  
Clif Charlesworth's team.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-16-69, GET 6:10, CDT 14:42 43/1

PAO This is Apollo Control at 6 hours, 16 minutes into the mission. Velocity now 11,479 feet per second. Apollo 11's distance from earth, 27,938 nautical miles. We're estimating the change of shift news conference for 3:30 p.m. central daylight time.

CAPCOM Hello, Apollo 11, Houston. We have scrubbed the midcourse 1. Over.

SC Roger. Understand you've scrubbed midcourse 1.

CAPCOM Roger.

CAPCOM Hello, Apollo 11, Houston. We see your middle gimbal angle getting pretty big. Over.

SC Well, it was, Charlie, but in going from one auto maneuver to another we took over control and have gone around gimbal lock, and we're about to give control back the DAP.

CAPCOM Roger, Mike. We see it increasing now.

SC Hey, Charlie. Houston, Apollo 11.

CAPCOM Go ahead, 11. Over.

SC Hey, maybe you better call Lou and tell him we might be a little bit late for dinner.

CAPCOM Okay, sure will. We'd like for you to turn on the fan on in O2 tank number 2, Buzz.

END OF TAPE

SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Maybe you ought to call Lou and  
tell him we might be a little bit late for dinner.  
CAPCOM Okay. Sure will. We'd like  
you to turn the fan on in 02 Tank No. 2, Buzz. And, 11,  
did you, on your optics calibrations, did you proceed  
or recall the program? Over.  
SC We recalled the program.  
CAPCOM Roger.  
SC And 02 Fan No. 2 is on.  
CAPCOM Roger.  
SC Houston, Apollo. I've got a  
CRYO pressure light, and a master alarm. It's reset.  
CAPCOM Roger. We suspected that. That's  
why we had you turn the fan on. We were getting pretty  
close to the caution warning limits. We were trying to  
prevent that.  
SC Okay.  
PAO This is Apollo Control at 6 hours,  
31 minutes. At the present time the spacecraft is  
29 363 nautical miles from earth and the velocity continuing  
to drop off gradually, reading now 11 192 feet per second.  
Flight Director, Gene Kranz, has taken over as Flight  
Director now from Clifford Charlesworth. Kranz has been  
reviewing the status of the spacecraft's systems with his  
team of flight controllers; everything looks very good at  
this point. The crew has been advised that the mid-course  
correction 1, the first opportunity for mid-course correction,  
of which has been scheduled into the flight plan at about  
13 hours, 30 minutes will not be performed. A correction  
of mid-course had been scheduled at 11 hours, 45 minutes  
into the flight plan and that will not be performed  
according to the tracking data we have at this time. The  
crew, up until their sleep period which will begin in  
about 13 hours, 30 minutes or about 7 hours from now will  
be involved generally in a routine of housekeeping type  
activities aboard the spacecraft. At the present time  
they should be involved in some mid-course navigations.  
At 6 hours, 32 minutes this is Apollo Control of Houston.  
SC Houston, Apollo 11.  
CAPCOM Go ahead 11. Over.  
SC Roger. You looking at our Delta - R -  
our Delta-V? Looks like Delta R's a pretty large area.  
We want to talk about it before we incorporate it.  
CAPCOM Stand by Mike. We don't have  
anything on our paneling here I don't think, on the  
DSKY. Stand by.

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT 14:57, GET 6:25 44/2

SC Okay. Our NOUN 49 is reading  
register 1 plus 08793. Register 2, all balls.  
CAPCOM Copy.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, CDT: 15:07, GET: 6:35 45/1

CAPCOM 11, Houston. Guidance is looking  
at the 940, 49 stuff, so we'll be back with you momentarily,  
over.

SC Okay, Charlie, I think we'll just  
hold right here in the program.

CAPCOM Roger, we got the DOWN light now, over.

SC Okay.

CAPCOM Hello, Apollo 11, Houston. We'd  
like you to reject the 940, 49 stuff on the DSKY right now,  
Mike, and try it again, over.

SC Okay, will do.

CAPCOM Okay, Houston, Apollo 11. Here's  
another 49 for you. Are you getting it on the DOWNLINK.

SC Roger, we see it, stand by.

CAPCOM Hello, Apollo 11, Houston. We  
recommend you accept the NOUN 49 display on the DSKY now.  
Over.

SC Okay. It looks like an awful big  
one. We noticed that you had moved star number 2 to the  
tail-end of the listing, and we should be marking first on  
star 40. Did that have anything to do with it?

CAPCOM Negative. We don't believe so,  
Apollo 11. We think that this is possibly due to some TOI  
dispersions, and it's probably satisfactory so go ahead and  
accept this. It fits our criteria anyway that if you repeat  
a Mark and you get an equivalent size, and we'll have to go  
ahead and accept it. And this is an equivalent size 0. Over.

SC Okay, we'll do it.

CAPCOM And, 11, Houston. Your state vector  
in the LM slots is good. Over.

SC Roger. Thank you.

SC Houston, Apollo 11. If you like this,  
we'll accept it as well.

CAPCOM Stand by.

CAPCOM Hello, Apollo 11. Houston. We  
recommend you accept the NOUN 49. Over.

SC Okay, Charlie. Thank you. We'll do  
that now.

SC Now we're going to proceed on this  
one, too, Charlie.

CAPCOM Roger. Copy.

END OF TAPE

SC  
noun 49 for you.

Houston, Apollo 11. Another

CAPCOM

Rog, we copy. Stand by.

CAPCOM

like you to recycle and do this one over again. Over.

SC

Okay.

PAO

This is Apollo Control at 6 hours 52 minutes. Apollo 11 now 31,565 nautical miles from earth and the velocity is 10,789 feet per second. The crew at this time is involved in midcourse navigation using their onboard optical system. We have completed the changeover in briefing of shifts here in Mission Control, and the crew activities, until the sleep period begins, will consist of housekeeping, functions aboard the spacecraft, changing out carbon dioxide filters. They will not be doing the midcourse correction scheduled for 11 hours 45 minutes into the flight as the first opportunity. The change of shift briefing is scheduled to begin shortly. Any conversations that develop with the crew during that period of time will be tape recorded and we'll play those back following the change of shift briefing. This is Apollo Control at 6 hours 53 minutes.

END OF TAPE

PAO This is Apollo Control, 7 hours, 21 minutes into the flight of Apollo 11. During the change of shift briefing, we accumulated about 4 minutes of tape conversation with the spacecraft. That conversation generally related to the onboard batteries, which are currently being charged - a routine operation - and also the midcourse navigation exercise that the crew is currently involved in. We'll play back the tape for you now, and then stand by for any live conversation with the crew.

SC Houston, Apollo 11.

CAPCOM Go ahead, Apollo 11. Over.

SC Roger. Why don't you sing out when you think we've done enough battery charging on B.

CAPCOM Roger. Stand by, Buzz. Over.

CAPCOM Apollo 11, Houston. We'll be charging battery B up until the sleep period. We'll discontinue charging at that time. Also, at about 12:25 in the flight plan, we have battery A charge. That has been deleted. Over.

SC Roger. Understand. We'll charge until the sleep period on B and delete the battery A charge.

CAPCOM Affirm.

SC And, Houston, Apollo 11. These AUTO OPTICS MANEUVERS or P23's AUTO MANEUVERS don't seem to be going to the substellar point. Can you come up with the roll pitch, and yaw angle for the substellar point on this star. It's our second star.

CAPCOM Roger. Stand by.

CAPCOM Hello, Apollo 11, Houston. Your angles in the flight plan we feel are still good. 198.6, 130.7, 340.0. Just slightly off than those in the flight plan. Over.

SC Okay, and we'll try that.

SC Charlie, state those 3 angles one more time. I'd like to confirm them before I maneuver.

CAPCOM Roger. Roll and pitch are slightly off than what's in the flight plan, 11. Roll is now 198.6, pitch is 130.7. Over.

SC Roger. Roll 198.6, pitch 130.7, and yaw 4000.

CAPCOM That's affirmative.

SC Houston, Apollo 11. I think the problem here is that that attitude just is not too close to the substellar point. I'm having them maneuvered quite a bit, and that's in progress now, so stand by for some more.

CAPCOM Roger. We copy all.

CAPCOM Hello, Apollo 11, Houston. We've run the angles given in the flight plan for the P23 attitude through the machines down here and they come up with the same thing every time. We think everything's going correctly, Mike, and we're wondering if the nonsymmetrical horizon might be giving

APOLLO 11 MISSION COMMENTARY 7/16/69 CDT 15:53 GET 7:21 47/2

CAPCOM a problem. Over.  
SC Yes, I'd say - it could be, Charlie. Stand  
by here. We'll get another Mark for you.  
CAPCOM Okay.  
SC Houston, Apollo 11. Noun 49 for you.  
CAPCOM Roger; copy. Stand by.  
CAPCOM Hello, Apollo 11; Houston. We recommend  
you accept the Noun 49. Continue through your sequence of  
sightings and then we'll analyze the data afterwards. Over.  
SC Okay. Houston, Apollo 11. Star 40 just  
disappeared now in the sextant. Could the trunnion angle 47  
something be a little higher?  
CAPCOM Stand by. Hello, Apollo 11; Houston.  
We'd like you to press on to star 44. Over.  
SC Yes, Roger. How many Marks did you record  
on star 40?  
CAPCOM Stand by, Mike.  
SC Okay.  
CAPCOM 11, Houston. We copied 2 good Marks.  
Over.  
SC Okay.

END OF TAPE

SC Houston, Apollo 11.  
CAPCOM Go ahead. Over.  
SC Roger. 44 is just not bright  
enough for this. There's a reddish glow filling the black  
area of the sextant and the star is lost somewhere in there and  
I can not see it.  
CAPCOM Roger. Stand by. We'll come up  
with another star. Over.  
SC Yes. I'd appreciate that.  
CAPCOM Hello Apollo 11, Houston. We'd  
like you to go on to star 45. Over.  
SC Okay.  
CAPCOM And, Mike, we think these large  
Delta-Rs, NOUN 49 you're getting, is really meaningful since  
it's been . . . TLI since we had a state vector update  
and we think it's normal. Over.  
SC Okay. Could be Charlie. Some of  
the area markings I might not have had precisely the  
sub stellar point. I think as time goes by, they've been  
coming more accurate but Olean up here is just flat invisible.  
CAPCOM Rog.  
SC Sam Houston, Apollo 11. Understand  
it's the same 3 gimbal angles you gave me should be valid  
for star 45 as well. Is that affirmative?  
CAPCOM I'm believe that's right. Stand by  
1. Over.  
SC Okay.  
CAPCOM That is negative. Stand by 1.  
SC Okay, cause it's quite a difference  
between the gimbal angles you have and the gimbal angles  
the program was but with inaccurate state vector I'm inclined  
not to believe the program.  
CAPCOM Stand by.  
SC Houston, Apollo 11. LMB is back  
on the line.  
CAPCOM Roger. Copy.  
SC Read you bye, bye.  
CAPCOM Roger same, Buzz. And 11, the angles  
for you are 1978 roll, 1285 pitch, 3400 yaw.  
SC Okay. Just as a matter of comparison,  
P-23 for this star would like to go to 235.66, 154.31 and  
31365. Over.  
CAPCOM Roger. We copy 11. We understand  
the program can give you almost an infinite combination of  
angles NP-23 and it's not too unreasonable. If you'll stand  
by we'll look at these - that we see on the DSKY. Over.  
SC Okay. Then in the meantime I'll  
just go ahead and maneuver to yours. 197.8, 128.5 and  
340.0.

APOLLO 11 MISSION COMMENTARY, 7-16,69, CDT 16:03, GET 7:31 48/2

CAPCOM

Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 7:41:00 CDT 16:13 49/1

SC Houston, Apollo 11.  
CAPCOM Go ahead. Over.  
SC Okay, Charlie. Is the attitude  
you gave me on star number 45. The radial is off, I'd say,  
a good 30 degrees in roll and the star is not in sight. Over.  
CAPCOM Roger. Stand by.  
SC Something's wrong with those  
attitudes.  
CAPCOM Hello, Apollo 11, Houston.  
I wondered if you have auto optics selected. Over.  
SC That's affirmative.  
CAPCOM Roger. Looks like to us we need  
a proceed, Mike, to get the sextant pointed at the star. Over.  
SC Okay. Stand by.  
CAPCOM 11, Houston. Those shaft and  
trunnion angles were exactly what we were computing on the  
ground. Over.  
SC Okay, I'm going to trim up the  
attitude here. I'll give it another try.  
SC Okay, I have it loud  
and clear, now, Charlie, so I might as well do a bunch of  
marks on this one to get a horizon count.  
CAPCOM Roger. Stand by.  
SC It still looks like I'm far from  
the substellar point, however, I'm off quite a bit in roll.  
CAPCOM Roger, we'd like you to mark  
right where it is now, Mike, and we'd like two sets of marks  
on this. Over.  
SC Okay, fine, but the radial is  
not parallel to the horizon. I have to move off quite a bit  
in order to get it parallel to the horizon.  
CAPCOM Apollo 11, Houston. Our  
procedures guys are saying that the radial does not have to  
be parallel. Over.  
SC Well, then we're going to have  
to substellar point it for now.  
CAPCOM Rog.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 7:51:00, CDT 16:23, 50/1

SC Houston, you copy that noun 49?  
CAPCOM Roger, we see it 11. Stand by.  
CAPCOM Apollo 11, Houston. We would like  
you to accept this one and every mark thereafter, over.  
SC Okay.  
SC Do you need me to wait in the noun 49  
display, for any length of time?  
CAPCOM Negative.  
SC Okay.  
SC Okay, Charlie. I'll be glad to give  
you as many of these as you like.  
CAPCOM Roger, we'd like six marks on star 45,  
Mike and then we'll probably go back to star 2, again. Stand  
by, we'll have further word on that.  
SC Okay.  
SC They seem to be getting smaller Charlie.  
Are you sure you wouldn't like some more?  
CAPCOM Stand by Mike.  
SC It's no trouble.  
CAPCOM Right, stand by.  
CAPCOM Apollo 11, Houston. We'd like you  
to do 2 more on Star 45, over.  
SC Okay.  
SC Okay, Charlie, there's your two more  
marks. Where do you want to go from here?  
CAPCOM Stand by.  
CAPCOM Hello Apollo 11, Houston. We'd like you  
to go back to star number 2 with an attitude as follows, roll  
1952 pitch 1239 yaw 3400. Mike that'll give you a trunion  
angle of about 31.4 over.  
SC Okay I understand star number 2 and  
roll 195.2, pitch 123.9, and yaw 340.0, over.  
CAPCOM That's affirmative.

END OF TAPE

SC Okay Charlie. On there, I've got a trunnion angle of 30.5 degrees. Again, miss a line considerably in a row and I do believe that's important to getting good marks.

CAPCOM Stand by.

SC See if my radicals not down, then I'm not marking normal to the right and I'm not marking at the sub stellar point. I'm marking off somewhere else.

CAPCOM Stand by 1. Over.

SC Okay.

CAPCOM Apollo 11, Houston. The ground computed values for your shaft and trunnion are just what your getting on the DSKY there, Mike. The horizon looks cocked off to you - you look like your off in roll because the angles that we gave you to maneuver to to prevent LM reflection from fouling up your optics. We feel like a - you should go ahead and mark on the stars just as is. Over.

SC Okay.

SC I'll bet you a cup of coffee on it.

CAPCOM Copy.

SC VERB - NOUN 49 for you now, Charlie.

CAPCOM Roger. Stand by.

CAPCOM Apollo 11, Houston. We'd like to accept this one and give it 2 more and that will be enough. Over.

SC Okay.

PAO This is Apollo Control 8 hours, 8 minutes and Apollo 11 now 38 812 nautical miles from earth and traveling at a speed of 9682 feet per second. And we've just put in a call to the crew; we'll stand by for - -

SC It just appears to me that you have to have a radical. Change it to the horizon at the point at which you mark or else your not at the sub stellar point here out front, laterally and therefore you're measuring a larger trunnion angle than you should.

CAPCOM Seems so to me. Our procedures people are working on this and we'll be back with you momentarily. Over.

SC Thanks sir.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/16/69 CDT 16:43 GET 8:11 52/1

CAPCOM Hello, Apollo 11; Houston. We'd like you to go to ACCEPT. We'll have a PTC REFSMMAT for you momentarily. Over.

SC Roger. Going to an ACCEPT.

PAO The PTC REFSMMAT, which capcom, Charlie Duke, just referred to is the passive thermal control attitude that the crew will place the spacecraft in. In this attitude the spacecraft will be rotated at a rate of about 3 revolutions per hour to maintain the proper temperature balance.

CAPCOM Hello, Apollo 11; Houston. We're through with the load. You can go back to BLOCK.

SC In BLOCK. Thank you.

CAPCOM Hello, Apollo 11; Houston. We'd like you to do a P52, option 1 preferred, and established PTC is listed in the flight plan at 12 hours. We'd like you to commence that right now, Mike. And we have some stars recommended for you. First star's 26, 30, and 24, when you get to attitude 000. Over.

SC Okay, Charlie. We're off the wick right now. We understand you're ready for us to do a P52, option 1?

CAPCOM 11, it's a P52, option 1, preferred. Over.

SC Understand. Let's see that - Spica, Menkent, and what else?

CAPCOM Roger. Stars - codes are stars 26, 30, and 24. Over.

SC 25 - 24. Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 8:31:00, CDT 17:03, 53/1

CAPCOM Apollo 11, Houston. We notice your program alarm mike was due to use any stars in the P23 attitude. If you'll go to 000, the stars we gave you will work, over.

SC Okay, understand.

CAPCOM Hello Apollo 11, Houston. Prior to you starting your P52, we'd like to give you new CSM state vector, over.

SC Roger. When we finish the maneuvering we'll give you the - -

CAPCOM Roger, we're standing by.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 8:51, CDT 17:23, 54/1

SC Houston, Apollo 11, the DSKY is yours.  
CAPCOM Apollo 11, Houston. Go ahead over.  
SC Roger, the DSKY is yours.  
CAPCOM Roger, stand by.

PAO This is Apollo Control at 8 hours 59 minutes into the flight of Apollo 11. The spacecraft altitude is currently reading 42 thousand 7 hundred 53 nautical miles, and we show a velocity of about 91 hundred feet per second. We are in the process now of up linking to the space craft attitude for the passive thermal control mode. Under this mode the spacecraft will be rotated about its X axis at a rate of about 3 revolutions per hour to maintain proper temperature balance within the spacecraft. The crew has completed the midcourse navigation exercise. They will shortly be aligning the spacecraft stable platform, used as a attitude reference in the guidance system. This is a routine procedure, and following that, the spacecraft will be placed in the passive thermal control mode where normally it would be left during the sleep period. The cabin temperature in the command module, has been running between 65 and 70 degrees. The current spacecraft weight is 96 thousand 4 hundred 60 pounds.

CAPCOM Hello Apollo 11, Houston. You can do the verb 66. The computer is yours and then the P52 option 1 preferred, over.

SC Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-16-69 CDT 17:43 GET 9:11 55/1

PAO This is Apollo Control at 9 hours, 13 minutes into the flight of Apollo 11. Based on biomedical data, a flight surgeon reports that it appears the crew removed their pressure garments - their pressure suits at about 8:00 PM for the Commander, Neil Armstrong and Command Module Pilot, Mike Collins. Lunar Module Pilot, Buzz Aldrin apparently got out of his pressure suit about 1 hour earlier or about 7 hours ground elapsed time. The spacecraft is currently 44 529 nautical miles from earth and the velocity has dropped now to 8983 feet per second. We do have, rather poor lock with the spacecraft antenna at this time accounting for the noise on the air to ground circuit. We'll take down the circuit until we reestablish better lock and we'll record any conversations that occur in the interim. At 9 hours, 14 minutes this is Apollo Control Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/16/69 CDT 17:55 GET 9:23 56/1

CAPCOM Apollo 11, Houston. If you read, at this attitude 000 is pretty bad for our COMM. In fact, we've lost all data with you. An unreadable on the void. We recommend you do the P52, option 1 preferred. (garble)

SC Roger Camcom as soon as we finish our alignment, we'll maneuver it toward the pad, Joe.

CAPCOM Roger, 11. We copy. Recommend you go to this P52, option 1, preferred, and then go to PTC attitude. Over.

SC Then we get to stop.

CAPCOM When you get there to PTC attitude, it'll be pitch 90, yaw 0 on the high gain. Over.

SC Houston, Apollo 11. Over.

CAPCOM Roger, 11. You got a one by. Go ahead.

CAPCOM Apollo 11, Houston. You're about one by. Go ahead. Over.

SC Houston, Apollo 11. Over.

CAPCOM Roger, 11. Reading you about 4 by. How me? Over.

SC You're loud and clear, Charlie. We've pitched down some to get a better COMM attitude.

CAPCOM Roger. Did you copy our recommendation note - proceeding with the P52, Mike? Over.

SC Negative. We didn't. I've got that in work. I'm starting at the edge of it.

CAPCOM Roger.

END OF TAPE

PAO This is Apollo Control at 9 hours, 36 minutes into the flight of Apollo 11. The mission continuing to go smoothly at this point. The communications noise that we were experiencing previously cleared up after the crew was able to get the spacecraft in a good attitude for antenna log-on and we had one brief conversation which we taped and we're presently communicating with the crew at this time. We'll pick up the tape and then continue to follow live conversation.

SC Houston, Apollo 11. Over.

CAPCOM Roger 11. With you about 4 by IB.  
Over.

SC Hear you loud and clear, Charlie. We pitched down some to get a better comm attitude.

CAPCOM Roger. Did you copy our recommendation on proceeding with the P-52, Mike? Over.

SC And even if we didn't, I've got that in work. I'm sorry (garble).

CAPCOM Roger.

SC Houston, Apollo 11.

SC Houston, Apollo 11.

CAPCOM Go ahead 11. Over.

SC Roger. Copy our torquing angles.

We forgot to torque.

CAPCOM Roger. Stand by.

SC Gosh, the reason for delaying it Charlie is that - difficult to find 2 stars that are not occulted by the LM and also are not in the midst of a man-made star field up here with dumps.

CAPCOM Roger. We copy.

SC Okay.

CAPCOM Hello Apollo 11, Houston. You can torque to NOUN 93. Over.

SC Okay.

PAO That brings us up to date with the taped conversation that we had. We'll continue to stand by for any live communications with the spacecraft. Most of that conversation with Mike Collins involved the platform alignment which the crew is involved in at the present time, aligning the stable platform used by the Guidance System as an attitude reference. Apollo 11 is presently 46 688 nautical miles from earth and the velocity is 8750 feet per second.

SC Okay Houston, that completes the P-52. We verified the 3rd star with Antares and other optics are pointed there pretty closely. How do our platform drift angles look so far, Charlie?

CAPCOM Stand by.

APOLLO 11 MISSION COMMENTARY 7-16-69 CDT 18:08 GET 9:36 57/2

CAPCOM Hello Apollo 11, Houston. We didn't have a chance to get a good check for you. We're going to run a drift check in this alignment till the next one, approximately 12 hours and we'll have something for you later. Over.

SC Okay.

CAPCOM Hello Apollo 11, Houston. We'd like you to establish your PTC. We recommend you select quads Alfa and Delta. Over.

SC Roger understand. Alfa and Delta quads.

CAPCOM That's affirmative.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 9:46, CDT 18:18 58/1

CAPCOM Hello Apollo 11 Houston. Would you verify that the attitude set switch is in GDC, over.

SC The set switch. Stand by one, Charlie.

CAPCOM Roger.

SC It is now.

CAPCOM Roger. It was on IMU.

SC That's affirmative.

CAPCOM Roger, thank you.

SC Houston, Apollo 11. How many miles out do you have us now?

CAPCOM We have you, stand by Buz. Roughly about 50 thousand, stand by.

SC It's a beautiful sight. Charlie on that PTC, we're just waiting 20 minutes here for all thruster activity to damp out. You might let us know how that's coming.

CAPCOM Roger, will do. We have you about 48 thousand miles now.

SC Thank you.

SC Houston, Apollo 11. We still have our oxygen fan on for tank 2. Is that what you want?

CAPCOM Stand by.

SC Hey Charlie I can see the snow on the mountains out in California, and it looks like LA doesn't have much of a smog problem today.

CAPCOM Roger Buz, copy. Looks like there's a good view out there, then. And Apollo 11, Houston. We would like you to keep the O2 fan on. It will give you an ECS configuration prior to sleep, over.

SC Okay, fine.

END OF TAPE

SC Charlie, with the monocular I can spot  
a definite green cast to the San Fernando Valley.

CAPCOM Roger.

SC Yes.

CAPCOM How's the Baja California look, Buzz?

SC Well, it's got some clouds up and down  
it, and it looks pretty good - circulation system a couple  
of hundred miles off the west coast of California.

CAPCOM Roger. 11, we'd like you to close the  
waste storage vent valve right now.

SC Okay.

SC (Garble) Waste storage vent valves  
closed.

CAPCOM Copy.

CAPCOM Hello, Apollo 11; Houston. We'd like -  
the rates are looking pretty good right now on the PTC, but  
we'd like you to continue holding. Over.

SC Okay, fine.

SC (Garble)

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 10:16, CDT 18:48, 60/1

CAPCOM Hello Apollo 11, Houston. Your rates look really great. Now you can start your PPC.  
SC Okay, thanks Charlie.  
SC Houston, 11.  
CAPCOM Roger, go ahead 11.  
SC Roger, if you'd like to delay PPC efforts for 10 minutes or so we can shoot you from TB number 78. We'll leave that up to you.

CAPCOM Roger, stand by.  
CAPCOM Hello Apollo 11, Houston. We'll have our answer for you on the TV in about 1 minute. Over.  
PAO This is Apollo Control at 10 hours 26 minutes into the flight of Apollo 11.  
CAPCOM Houston we are ready at Goldstone for the TV. It'll be recorded at Goldstone and then replayed back over here. Neil, anytime you want to turn her on, we're ready, over.

SC Okay, it'll take us about 5 minutes to get the rate.  
CAPCOM Roger.  
PAO Capcom, Charlie Duke, advised the crew that we would be recording the television at Goldstone. We don't have an estimate at this time as to how long it will take to get a play back of that from Goldstone.

CAPCOM Could you verify the reading on your 02 flow indicator? over.  
SC We're still on point 2. We just inadvertently touched the rapid repress button. That made a temporary glitch in the flow.

CAPCOM Roger, during that glitch there, did it go almost a peg high? over.  
CAPCOM Apollo 11, Houston. Could you tell us if the 02 flow indicator was pegged high prior to closing the waste storage vent valve, over?

SC No it was not.  
CAPCOM Roger, thank you.  
CAPCOM Apollo 11, Houston. While ago we tried those scan limits, and disabled the auto drive on the high gain. We'd like you to position the antenna at pitch 30 yaw 270, go to react, that will give us narrow beam widths, over.

SC That - -

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-16-69 CDT 19:03 GET 10:31 61/1

CAPCOM -this will give us a narrow beam  
width. Over.  
SC That yaw 270 and pitch 3 ze - what  
was the pitch?  
CAPCOM Pitch 3 zero, Neil.  
SC Okay. I think we've got you.  
CAPCOM Roger. We've got a good signal  
there. Thank you much.  
SC Okay Houston. We are sending  
picture of earth down right now so you can let us know if  
they're receiving us also.  
CAPCOM Roger 11. Goldstone is receiving  
the TV. Stand by. We'll let you know on the quality. Over.  
CAPCOM Hello Apollo 11, Houston. Goldstone  
says that the TV looks great. Over.  
SC Roger (Garble)  
CAPCOM Hello Apollo 11, Houston. Did you  
copy? Over.  
SC Roger we copied, Charlie.  
CAPCOM Roger. Your transmissions the last couple  
of times have been about 2 by. Over.  
SC Okay. How do you read me now?  
CAPCOM Roger. Your 5 by now.  
SC Okay. We're zooming the lens on in  
so that it will just about fill the monitor.  
CAPCOM Roger.  
SC Okay. It's been a full film now.  
CAPCOM Copy 11.  
SC And how about the F stops. Is  
22 going to be accurate?  
CAPCOM Stand by, we'll get with the  
Goldstone TV guy. We don't have anything here at Houston.  
Stand by.  
SC It looks good on the monitor as  
far as the S-band goes. Therefore, we just assumed it's  
okay at Goldstone.  
CAPCOM Hello Apollo 11, Houston. Goldstone  
says it - TV looks really great, 5 by, we don't - ABC looks  
like it's working fine. The F-22 is good; we have no real  
white spots. They're real pleased with it. Over.  
SC Okay. You just got out Charlie.  
We understand that it's looking great. We'll leave it the  
way it is and wait for you to come back on.  
CAPCOM Roger. And how do you read me now?  
Over.  
SC 5 by.  
CAPCOM Okay. My comments were - my com-  
ments were from Goldstone that they see no white spots as  
we saw in 10. Looks like the ABC's working real well. The  
F-22 looks good. Over.

SC Okay. Very good. Well we shut out the sun coming in from the other windows into the spacecraft, so it's looking through a - a number 1 window and there isn't any reflected light. Now they ought to be pretty good pictures.

CAPCOM Roger.

CAPCOM Hello Apollo 11, Houston. We'd like you to keep the TV off for about 10 minutes or so, so we can get some good comparison on the camera. You can do anything your heart desires on the TV. Interior, exterior, pan in and out, anything you'd like. Over.

SC You have it Houston. Over.

SC Houston, Apollo 11. Over.

CAPCOM Roger go ahead. Over.

SC You know (garble) you keep cutting out. We heard up to "you can do anything" and then after that we didn't hear anything and we knew that wasn't right any how because we can't but what do you want us to do?

CAPCOM Roger. We'll check this stop link on our voice. The transmission on the TV was we'd like to get about 10 minutes worth of signal at Goldstone and we can look at the camera quality back here at Houston for about 10 minutes or so, when they pass it back into us. What we were saying was that you can go interior or exterior on the camera. On the exterior shots, we'd like to look - -

SC Say again.

CAPCOM Stand by.

SC Turn over what we were seeing.

SC Hey Houston. You suppose you can turn the earth a little bit so we can get a little bit more than just water.

CAPCOM Roger 11. I don't think we've got much control over that. Looks like you'll have to settle for the water.

CAPCOM 11, Houston. We're going to change - thinking about changing our voice uplink to another sight. If you'll stand by, we'll see if we can improve the quality. Over.

SC Okay Charlie.

SC We'll stand by for your call.

CAPCOM Apollo 11, Houston. We'll try once more on this TV request. We'd like 10 minutes worth of TV. We'd like a narrative if you could give us one on the exterior shots. We also suggest you might try the - an interior position. Over.

SC Roger. We're seeing the center of the earth as it appears from the spacecraft in the eastern Pacific Ocean. We have not - -

END OF TAPE

SC - from the spacecraft, and the eastern Pacific Ocean - we have not been able to visually pick up the Hawaiian chain, but we can clearly see the western coast of North America, the United States, the San Joaquin Valley, the High Sierras, Baja California, and Mexico down as far as Acapulco, and the Yucatan Peninsula, and you can see on through Central America to the northern coast of South America, Venezuela and Columbia. I'm not sure you'll be able to see all that on your screens down there

CAPCOM Roger, Neil. We just wanted a narrative such that we can - when we get the playback, we can sort of correlate what we're seeing. Thank you very much.

SC I didn't see anything but the DSKY's so far.

CAPCOM Looks like they're hogging the windows.

SC You're right.

CAPCOM Hello, Apollo 11. Houston. On your cryos, we'd like at this time for you to place all 4 cryo heaters to AUTO and turn off all 4 cryo fans. Over.

SC Okay. All 4 cryo heaters are AUTO. And all 4 cryo fans are off. Uh huh.

CAPCOM Roger. That's going to be your sleep configuration.

SC Okay.

CAPCOM And, Buzz, we'll be terminating the battery charge in about a half hour.

SC Roger.

CAPCOM Hello, Apollo 11. Houston. You can terminate the TV at your convenience. We've got enough tapes. And you can start TTC at your convenience. The REG's look super for starting up. Over.

SC Roger, Charlie.

PAO This is Apollo Control at 10 hours, 51 minutes. That TV transmission lasted about 15 minutes. Goldstone reported that we did get good quality on it. We estimate that it will be somewhere between an hour and a half or two hours before we have the television available here in Houston to play back. The lines will have to be called up between Goldstone and Mission Control Center, and the conversion equipment brought up on line before we'll be able to play back the television from that transmission. At the beginning of the TV transmission, the spacecraft was approximately 50 980 nautical miles from Earth, and at the conclusion they were about 52 248 nautical miles from Earth.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 10:51, CDT 19:33 63/1

PAO 9 hundred 80 nautical miles from earth and at the conclusion they were about 52 thousand 2 hundred 48 nautical miles from earth.

CAPCOM Apollo 11, Houston. We have a flight plan update for you and some P37 block data, if your ready to copy, over.

SC Stand by.

SC Okay, Houston, PTC is started now, and looks good to us, and we'll be ready to copy in a minute or two.

CAPCOM Roger, copy, 11.

SC Houston, Apollo 11. Ready to copy the flight plan update and P37.

CAPCOM Roger, stand by 1, Buzz.

CAPCOM Apollo 11, Houston. Coming at you with the P37 block data, over.

SC Okay.

CAPCOM Roger, 02744 5363 minus 165 07314  
03744 8016 minus 165 07246 GETI 04644 6141 minus 165 09703  
05544 8209 minus 165 09642, ready for your readback, over.

SC Roger, 02744 5363 minus 165 07314  
03744 8016 minus 165 072 46.

END OF TAPE

SC 03 744 8016 minus 165 072 46 046 44 6141  
minus 165 097 03 055 44 8209 minus 165 09642. Over.

CAPCOM Roger, 11. That was a good readback. That was the block data scheduled for 12 hours. We'd like to do - just say that on a flight plan update here, just to remind you of some things, and you can do them at your convenience, and then go to sleep early if you'd like. We don't have anything else planned, but we'd like to just remind you on the filter change, the O2 fuel cell purge. And we'd like to have LM CM DELTA-P and accomplish the presleep checklist.

SC Okay. We've completed the filter change and we'll get started on the fuel cell purge, and stand by for the LM CM DELTA-P.

CAPCOM Roger, 11. Would you hold off on the fuel cell purge. E COMM is saying we might not have to do that. Over.

SC Okay.

SC Charlie, the LM CM DELTA-P is 0.5.

CAPCOM Copy. 0.5. Out.

CAPCOM Hello, Apollo 11. Houston. We've just decided to delete the O2 fuel cell purge. Over.

SC Roger. Delete the O2 fuel cell purge.

CAPCOM Hello, Apollo 11. Houston. We've been noting some funnies on the O2 flow indicator. For instance, we kind of got a suspicion that the transducer - we expected to see an O2 flow pegged high with the waste stowage vent to VENT. It was not. We also noted some funny indications when you closed the waste stowage vent valve. We're going to take a look at this through the night, and we'll be with you in the morning with an assessment of the problem. Also, we'd like to ask specifically, when you place the waste stowage vent valve to vent does the detent - correction - does the arrow line up with the detent? Over.

SC Stand - stand by one, Charlie. We'll give you something on the detent.

CAPCOM Roger.

SC Right now it's at CLOSED, and I lined up with CLOSE before the vent, and best I can recall, it was quite accurately lined up with vent. Would you like me to go to VENT again momentarily and see where it lines up?

CAPCOM That's negative. That question's answered. Thank you much.

SC Okay.

SC (Garble)

PAO This is Apollo Control. During that last transmission you heard Cap Com Charlie Duke advise the crew that we are not seeing as high an O2, or oxygen

PAO flow, as we would have expected at this point. This would indicate that the enrichment of the cabin atmosphere, which was 60 percent oxygen, 40 percent nitrogen at launch and which is normally enriched with pure oxygen during the course of the flight, is not enriching as rapidly as we would expect. This could be a transducer problem - one of the devices that measures the O2 flow rate - or possibly a partial obstruction of one of the vents. The problem is not thought to be significant at this point, and we'll be monitoring the O2 flow during the night.

CAPCOM Stand configuration for you. Over.

SC Roger. Go ahead.

CAPCOM Roger, Buzz. We'd like you to place the S-band antenna OMNI-A switch to the BRAVO position. S-band antenna OMNI switch to the OMNI position. The high gain track to MANUAL, and the high gain angles will be yaw 270, pitch minus 50. Over.

SC Roger. Understand. OMNI to baker and OMNI MANUAL, and the angles are yaw 270, pitch minus 50, and was that narrow or wider? Over.

CAPCOM Stand by. Buzz, we'd like it in wide, and you can set that configuration up now. Over.

SC I've been working.

SC (Garble)

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 11:11, CDT 19:53, 65/1

CAPCOM Hello Apollo 11, Houston. You can terminate battery bravo charge, and we'd like a crew status report, we're about to tell you good night, over.

SC Roger, stand by.

SC Houston, Apollo 11, the battery charging is complete and the crew status report is as follows. Radiation CDR 11002, CMP 10002, LMP 09003, negative medication fit as a fiddle, over.

CAPCOM Rog, copy 11, thank you much. We'd like to ask one question. Have you tried the gas separator on the water, how is that working, over.

SC Yea, Mike's got a couple of comments on that.

SC It's working good so far, Charlie. We've got one installed on the water gun and the other one installed on the spigot down in the LEV, and we - like to mention one problem with them is that they leak at the junction between the food bag and the water filter, however with that extension they seem to be working pretty good. We were getting some gas through innitially, and I think that was just getting purged out to begin with and the last tube full we poured was almost free of bubbles, over.

CAPCOM Roger, sounds good. We'll check in on that problem with the span guys and let you know in the morning. If you have to call us tonight, we'd like you to do it on down voice back up. We're configuring the MSFN for that mode and as far as we can see you're cleared for some z's, over.

SC Okay, maybe we'll get around to lunch.

CAPCOM How about a peanut butter and jelly?

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-16-69 CDT 20:03 GET 11:21 66/1

PAO This is Apollo Control at 11 hours, 29 minutes into the flight of Apollo 11. We don't expect to hear a great deal more from the crew tonight. At about 11 hours, 20 minutes we said good-night to them from Mission Control and they're beginning their sleep period about 2 hours early. The additional time available for sleep was made available by deleting the mid-course correction. The first opportunity which occurred at 11 hours, 45 minutes. That mid-course correction has been moved to mid-course correction 2 to the opportunity of mid-course correction 2 of which would occur tomorrow. The last conversation we had with the crew, we received a status report and a report that they had taken no medication and were "fit as a fiddle". We also got a report from Mike Collins on the gas separation unit which is being flown on this flight. This consists of 2 stainless steel cylinders about 5 inches long and about an inch to an inch and half in diameter. The cylinders are attached to the water gun or to the water spigot on the food preparation panel and remove the gas from the water that flows through the filter. The filter actually has 2 filters inside. One which attracts water and one which repels it, in the process removing the gas. Mike Collins reported that the filters seem to be working quite well. That the water was coming out almost free of bubbles. He did report that they had a minor problem with a leak at the junction between the food bag and the filter. Mission Control advised that we would give that some thought and try to come up with some solution to it when they wake up tomorrow. At this time, Apollo 11 is 55 522 nautical miles from earth traveling at a velocity of 7920 feet per second. This is Apollo Control at 11 hours, 32 minutes.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 11:47, CDT 20:19 67/1

PAO This is Apollo Control at 11 hours 47 minutes into the flight of Apollo 11. At this time we are receiving the television data from Goldstone. The data is coming in. It will be processed here and converted, and we estimate that it will be available for play back in about 20 to 30 minutes and we will have a firm time on that as soon as possible. At the present time Apollo 11 is 56 thousand 7 hundred 4 nautical miles from earth, and the velocity is 7 thousand 8 hundred 21 feet per second. We have had no further conversations with the crew since we passed along a good night to them at 11 hours 20 minutes. Getting them to bed about 2 hours ahead of the scheduled time on the flight plan, as a result of the deletion of midcourse correction 1. At 11 hours 48 minutes, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 12 hours 5 minutes. We expect to have the unscheduled television transmission, which came in to Goldstone California. It was taped there and has been transmitted to Mission Control center ready and converted for replay in color at 8:45 PM central daylight time. That would be about 7 minutes from now. The TV transmission runs for a total time of about 16 and a half minutes and there's an exterior shot out the window of the earth. At the time of the transmission Apollo 11 was some 50 thousand 9 hundred 80 nautical miles from earth. The transmission came into Goldstone at the ground elapsed time of 10:32:40, and ended about 16 minutes, 16 and a half minutes later, when the spacecraft was at an altitude of 52 thousand 2 hundred 48 nautical miles. We'll stand by for a replay of that transmission at 8:45 PM central daylight time.

CAPCOM Apollo 11 Houston.

PAO This is Apollo Control at 12 hours 12 minutes, and we expect to be ready to release the television transmission from the spacecraft which was received at Goldstone, California. That should be ready to go in a little less than a minute.

PAO And we are starting to get lock on from the tape replay and we expect that we will have a color picture shortly.

CAPCOM 3 minute TV, stand by and we'll let you know on the quality, over.

CAPCOM Apollo 11, Houston. Goldstone says that the TV looks great, over.

SC Roger, we're - -

CAPCOM Hello Apollo 11, Houston. Did you copy, over?

SC Roger, we copied, Charlie.

CAPCOM Roger your transmissions these last couple of times has been about 2 by, over.

SC Okay, how do you read me now?

CAPCOM Roger, 5 by now.

SC Okay we're zooming the lense on in so it will just about to the moniter.

CAPCOM Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-16-69 CDT 20:47 GET 12:15 69/1

SC -zooming the lens on in, until  
it just about fills the monitor.

CAPCOM Roger.

SC Okay. It's in full zoom now.

CAPCOM Copy 11.

SC And how about the F stops? Is  
22 going to be accurate?

CAPCOM Stand by. We'll get with the  
Goldstone TV guy. We don't have anything here at Houston.  
Stand by.

SC It looks good on the monitor as  
far as the F stop goes. Therefore, we just assumed it's  
okay at Goldstone.

CAPCOM Hello Apollo 11, Houston. Goldstone  
says it's - TV looks really great - 5 by.

SC Okay. You just got out Charlie but  
and I understand that it's looking great. We'll leave it  
the way it is and wait for you to come back on.

SC Okay. How do you read me now?

CAPCOM 5 by.

CAPCOM Okay. My comments were - my com-  
ments were from Goldstone. They see no white spots as  
we saw in 10; looks like the AGC's working real well. The  
F-22 looks good. Over.

SC Okay. Very good. Well we shut out  
the sun coming in from the other windows into the  
spacecraft so it's looking through the number 1 window and  
there isn't any reflected light right now so it ought to  
be a pretty good picture.

CAPCOM Roger.

CAPCOM Hello Apollo 11, Houston. We'd like  
you to keep the TV on for about 10 minutes or so, so we  
can get some good comparison on the camera. You can do  
anything your -

SC Houston, Apollo 11. Over.

CAPCOM Roger go ahead. Over.

SC Charlie, I'm sorry you keep cutting  
out. We heard up to you can do anything and then after  
that, we didn't hear anything and we knew that wasn't right  
anyhow because we can't. But what do you want us to do?

CAPCOM Roger. We want check the up link  
on our voice. The transmission on the TV was we'd like  
to get about - for Goldstone and we can look at the camera  
quality back here at Houston for about 10 minutes or so  
when they patch it back into us. What we were saying was - -  
We'd like a little - - Stand by.

SC Start over what we were saying.

SC Okay Houston. You suppose you could  
turn the earth a little bit so we can get a little bit more

SC than just water.  
CAPCOM Roger 11. I don't think we've got much control over that. Looks like you'll have to settle for the water.  
CAPCOM 11, Houston. We're going to change - thinking about changing our voice uplink to another sight. If you'll stand by, we'll see if we can improve the quality. Over.

SC Okay Charlie. We'll stand by for your call.

CAPCOM Apollo 11, Houston. We'll try once more on this TV request. We'd like 10 minutes worth of TV and we'd like a narrative if you could give us one on the exterior shots. We also suggest you might try an interior position. Over.

SC Roger. We're seeing the center of the earth as viewed from the spacecraft in the eastern Pacific Ocean. We have not been able to visually pick up the Hawaiian Island chain but we can clearly see the western coast of North America, the United States, the San Joaquin Valley. The High Sierra's, Baja, California and Mexico down as far as Acapulco and the Yucatan Peninsula and you can see on through Central America to the northern coast of South America, Venezuela and Columbia. I'm not sure you'd be able to see all that on your screens down there.

CAPCOM Roger Neil. We just wanted a narrative such that when we get the playback we can sort of correlate what we're saying. Thank you very much.

SC I didn't see anything but the DSKY's so far.

CAPCOM Looks like they're hogging the windows.

SC Your right.

PAO This is Apollo Control. The view that we have of the earth disc at this time, as near as we can tell, the north pole is to the left of the screen- -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69, GET 12:25, CDT 20:57, 70/1

PAO This is Apollo Control. The view we have of the earth disc at this time as near as we can tell, the north Pole is to the left of the screen. The land mass that was visible was the western coast of the United States. The earth then would appear to be rotated 90 degrees with the North Pole to the left and South American Continent extending toward the upper right of the globe but not visible.

CAPCOM Apollo 11 Houston. On your Cryos, we'd like at this time for you to place all 4 cryo heaters to auto, and turn off all four cryo fans, over.

SC Okay, all four cryo heaters are auto. And all 4 cryo fans are off.

CAPCOM Roger, that's going to be your sleep configuration. Buzz we'll be terminating the battery charge in about a half hour.

SC Roger.

CAPCOM Apollo 11, Houston. You can terminate the tv at your convenience. We've got enough tape and you can start PTC at your convenience, the rates look super for starting it up, over.

SC Roger, Charlie.

PAO That concludes the unscheduled television transmission. That transmission came in about 2 hours ago at a ground elapsed time of 10:32:40 beginning, lasted about 16 and a half minutes. At the beginning of the transmission Apollo 11 was about 50 980 nautical miles from earth and at the conclusion about 52 248 nautical miles. At the present time, the crew is in a scheduled rest period. They did indicate before going into the rest period, when we last heard from them, that they would probably use part of the time to get a bite to eat and then get some sleep. At this time Apollo 11 is 59 908 nautical miles from earth, traveling at a speed of 7,569 feet per second. At 12 hours 31 minutes, this is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/16/69 CDT 23:59 GET 15:28 75/1

PAO This is Apollo Control, 15 hours, 28 minutes ground elapse time. Apollo 11 crew still asleep according to Flight Surgeon Ken Beers here in Mission Control. The flight crew is still sleeping soundly at this time according to the biomedical telemetry being beamed down to the displays on his console. Here in the Mission Control Operations Room or MCOR as it is called the black team of flight controllers is settling in for the night headed up by Flight Director Glen Lunney. Some 7 hours remaining in the crews sleep period. Distance and velocity now showing 72,009 nautical miles out from Earth. Velocity now 6,750 feet per second. And at 15 hours, 28 minutes ground elapse time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 1:10 GET 16:38 76/1

PAO This is Apollo Control at 16 hours, 38 minutes ground elapsed time. Apollo 11, presently being tracked by the Honeysuckle Creek, Australia tracking station. Geographically the spacecraft is practically directly over or out from the Phillipine Islands. Now showing some 5 hours and 51 minutes remaining in the crew rest period. The crew still asleep at this time. Continuing to decelerate as the spacecraft gets out toward the change-over point between the Earth's sphere of influence and the Moon's sphere of influence. Velocity now showing 6493 feet per second. Apollo 11 now out 76 453 nautical miles from the Earth. And at 16 hours, 39 minutes ground elapsed time this is Apollo Control.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 4:15 AM GET 19:43 79/1

PAO This is Apollo Control, 19 hours, 43 minutes ground elapse time. Crew now has some 2 hours, 46 minutes remaining in the scheduled sleep period. Distance out-bound from Earth now 87,409 nautical miles. Apollo 11's continuing to decelerate in velocity, now traveling at 5,930 feet per second. All going well in the Apollo 11 mission. Crew sleeping apparently in deep sleep. Systems still performing quite well. And at 19 hours, 43 minutes ground elapse time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 GET 20:38:00 CDT 5:10 80/1

PAO This is Apollo control 20 hours 38 minutes ground elapse time. One hour 51 minutes remaining in the crew rest period. At this time, Apollo 11 on a line projected outward from earth as directly over the southern tip of the Indian sub-continent. Distance now 90,509 nautical miles. Velocity continuing to decelerate, now 5,788 feet per second. The crew is still asleep at this time, and at 20 hours 39 minutes ground elapse time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 6:10 GET 21:38 81/1

PAO This is Apollo Control 21 hours, 38 minutes ground elapsed time. Apollo 11 now being tracked by the tracking station at Madrid. Some 51 minutes remaining in the scheduled sleep period for the crew of Apollo 11. When the sleep period ends depends on the business of the day whether the flight controllers here and the spacecraft communicator wakes the crew up or whether they wake up on their own accord and call in to begin the second day of the translunar coast. Upon awakening the flight plan calls for change of the carbon dioxide removing filters in the spacecraft cabin. Now a report on the differential pressure between the lunar module and the command module. Update from the ground on consumables remaining. They will remain in the passive thermal control mode through the hour long eat period that follows the wakeup. After their breakfast meal the flight plan calls for some navigation excercises using the sextant and the program 23 computations of the onboard computer. These are star and earth horizons sightings. Presently Apollo 11 is 93 085 nautical miles out from earth. Velocity now 5638 feet per second. At 21 hours, 40 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 37:22, GET 22:49, 82/1

PAO This is Apollo Control at 22 hours, 49 minutes ground elapse time. The crew has been awake for some time according to the surgeon. Spacecraft communicator here in mission control with the green team, Bruce McCandless, is standing by to make a call to the crew. He's in the process of taking over from Ron Evans. Flight director, Cliff Charlesworth, has asked that he make a call to the crew. We're standing by for this call momentarily.

CAPCOM Apollo 11, Apollo 11, this is Houston.  
Over.

SC Good morning, Houston. Apollo 11.

CAPCOM Roger, Apollo 11. Good morning.

CAPCOM When you're ready to copy, 11, I've got a couple of small flight plan updates and your consumable updates, and the morning news, I guess. Over.

SC Apollo 11, Houston.

CAPCOM Go ahead, 11.

SC Roger. Standing by for your updates.

Over.

CAPCOM Okay, 11, this is Houston at time approximately 22:30 in the flight plan. In your post-sleep checklist and in all other post-sleep checklists, we'd like you to delete the statement that says AUTO RCS jet select 16 to ON, and what we're doing here is picking this up in the procedure for exiting PTC that's in your CSM checklist. And in the CSM checklist on page foxtrot 9-8 - if you want to turn to that - we'd like to change the order of the steps in that. Over.

SC Okay, page F 9-8. Go ahead.

CAPCOM Okay, right now it reads to exit G and N PTC then you've got a PAN 8 change that says AUTO RCS select 12 main A and B. And then you come down to printed stuff 1. We'd like to take and move the AUTO RCS select 12 main A and B down to be the second step, so the procedure would read Step 1 Manual attitude 3 excel command, Step 2 AUTO RCS select 12 Main A B, Step 3 would be verified deployed and so on. Over.

SC Roger, I copy. Is that AUTO RCS select 12 Main A B to be the -

CAPCOM Roger, it should be the second step in that procedure. At time 22:40 when you get to it, we'd like to commence a charge on Battery A. And at time 24:10 we have an updated attitude for your P-52 and optics calibration. Over.

SC Okay, 24:10. Go ahead.

CAPCOM Roger. P-52 and optics calibration attitude ROLL 330.5, PITCH 086.3, YAW 000.0. The nominal attitude is PAN 8-10 for the P-23 is still good. At time 25:30, approximately, after you complete P-23, we're requesting

APOLLO 11 MISSION COMMENTARY 7/17/69, CDT 37:22, GET 22:49, 82/2

CAPCOM a weight water dump down to nominal  
25 percent. Over.

CAPCOM Apollo 11, this is Houston. Did you  
copy the attitude in the waste water dump? Over.

SC Roger -

CAPCOM 11, this is Houston. We're not reading  
you at the present time. You're way out on the noise hold.  
Stand by.

CAPCOM Apollo 11, this is Houston. How do  
you read? Over.

SC Roger, Houston. Apollo 11. Loud  
and clear. How me?

CAPCOM Okay, beautiful. Did you copy the  
attitudes for the P-52 and the waste water dump? Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 22:59, CDT 7:31 83/1

SC

- coming in.

CAPCOM

the attitudes for the P52 and the waste water dump? Over.

SC

Rog. Okay, we note the battery charge as soon as we get around to it, and the attitude for the P52 optics cal, roll 330.5, 086.3 and yaw all zeros.

The attitude for the P23 as in the flight plan is okay, and I copy your battery charge. Crew status report as follows: 3 CDR, CMP 7, LMP 5.5, and we've completed the post sleep checklist. Standing by for a consumable update. Over.

CAPCOM

Roger. We're requesting a

waste water dump at GET 25:30 down to a nominal 25 percent, and here we go with the consumables update. At a GET of 22 hours, RCS total is minus 3.5 percent, alpha minus 3.5 percent, bravo minus 1.5 percent, charlie minus 5.0 percent, minus 4.0 percent, H2 minus 2 pounds, O2 minus 4 pounds. Over.

SC

Okay, stand by. I copied those

consumables, and I'll read you back our RCS quantities. We got 86 percent in alpha, 87 in bravo, 88 in charlie, and 90 in delta. Over.

CAPCOM

Roger. I copy. And did you copy

the waste water request?

SC

Roger. Waste waer - and we got the time for that, and that'll be down to 25 percent.

the time for that, and that'll be down to 25 percent.

CAPCOM

Okay.

SC

Houston, 11.

CAPCOM

Apollo 11, this is Houston. Over.

SC

Roger. We've started charging

battery A, and voltage started off a lot higher than I expected. It was just a little bit shy of 40. It looks like it's dropping down some now. This is the battery charge folder. You know yesterday when we were doing this on battery C it started out at entry, and it went lower than the battery charge before.

CAPCOM

Roger. Stand by a second, and I'll

get some reading on that.

SC

On charging battery A, now it's at about 39.3 and - oh, about 1.5 amps. Looks like it's gradually increasing in the amps starter.

CAPCOM

Roger. On RCM we're showing you

at 39.11 and your current's about what you reported.

SC

Okay, I guess you have to - -

CAPCOM

Alright, we're losing you in the

noise again, 11. Stand by.

END OF TAPE

CAPCOM Apollo 11, this is Houston. Over.  
SC Houston, Apollo 11. Go ahead.  
CAPCOM Roger, 11. On your battery charging question, we feel that it's probably a difference between individual batteries and it does seem to have gone away as sort of a start up transient here. Other factors that might conceivably have an influence on it would be battery temperature, things of this sort. EECOM seems to feel that it's operating within the normal design limits. Over.  
SC All right. Very good. Thank you.  
CAPCOM 11, this is Houston. If you are interested in the morning news I have a summary here from PAO. Over.  
SC Okay, we're all listening.  
CAPCOM Okay, from Jodrell Bank England via AP. Britian's big Jodrell Bank radio telescope stopped receiving signals from the Soviet Union's unmanned moon shot at 5:49 BDT today. A spokesman said that it appeared the Luna 15 space ship "had gone beyond the moon". Another quote: "We don't think it has landed", said the spokesman for Bernard Lovell, Director of the Observatory. Washington UPI: Vice President Spiro T. Agnew has called for putting a man on Mars by the year 2000, but Democratic leaders replied that priority must go to needs on Earth. Agnew, ranking government official at the Apollo 11 blastoff Wednesday, apparently was speaking for himself and not necessarily for the Nixon administration when he said, "We should, in my judgement, put a man on Mars by the end of this Century". Laredo, Texas, AP: Immigration officials in Nuevo Laredo announced Wednesday that hippies will be refused tourists cards to enter Mexico unless they take a bath and get haircuts. Huberto Cazaras, Chief of Mexican Immigration in Nuevo Laredo, said authorities in Mexico City, Alcapulco, and other popular tourist spots have registered complaints about the hippies. United Press International: Initial reaction to President Nixon's granting of a holiday Monday to federal employees so they can observe a national day of participation in the Apollo 11 moon landing mission mostly was one of surprise. Rodney Bidner, Associated Press: London AP: Europe is moon struck by the Apollo 11 mission. Newspapers throughout the continent fill their pages with pictures of the Saturn V rocket blasting off to forge Earth's first link with its natural satellite. And the headline writers taxed their imagination for words to hail the feat. "The greatest adventure in the history of humanity has started" declared the French newspaper Le Figaro which devoted 4 pages to reports from Cape Kennedy and diagrams of the mission. The tabloid Paris Soir proclaimed, "The whole world tells them Bravo". From the Communists Daily L'Humanite led with the launch picture and devoted its entire back page to an enthusiastic moon report describing the countdown and launch, the astronauts' wives and families and backgrounding lunar activities. Hempstead New York: Joe Namath officially reported to the New York Jets

APOLLO 11 MISSION COMMENTARY 7 17/69 CDT 7:41 GET 23:09 84/2

CAPCOM training camp at Hofstra University Wednesday following a closed door meeting with his teammates over his differences with Pro Football Commissioner Peter Roselle. London UPI: The House of Lords was assured Wednesday that a major American submarine would not "damage or assault" the Lochness monster. Lord Nomay said he wanted to be sure anyone operating a submarine in the loch would not subject any creatures that might inhabit it to damage or assault". He asked that the submarine's plan to take a tissue sample with a retrievable dart from any monster it finds can be done without damage and disturbance. He was told it was impossible to say if the 1876 Cruelty to Animals Act would be violated unless and until the monster was found. Over.

SC Roger, thank you, Bruce. That's interesting. That number 2 item we all (garbled) before we left and we hope we get a chance to see him when we return.

CAPCOM Roger, and I understand he was down there and really enjoyed watching the launch. We are think it was pretty magnificent and you all are doing a great job up there.

SC Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 7:51, GET 23:19, 85/1

PAO This is Apollo Control at 23 hours 22 minutes. Apollo 11's distance from Earth is 99 308 nautical miles. Velocity is 5 411 feet per second. The spacecraft weight is 96 361 pounds. A flight dynamics officer reports that in terms of distance Apollo 11 will reach the half-way mark at 25 hours 0 minutes 53 seconds. At that time the spacecraft will be 104 350 miles from both the Earth and the Moon.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 8:01, GET 23:29 86/1

All dead air and static.

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 8:16, GET 23:44, 87/1

PAO This is Apollo Control at 23 hours, 48 minutes. Capcom Bruce McCandless is getting ready to put in a call to the crew momentarily. Apollo 11's distance now is 100 685 nautical miles. Velocity 5356 feet per second.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger, go ahead Houston.

CAPCOM Roger. Mike, we've got some comments on the performance for P-23 for today if you've got a minute to talk.

SC He's all ears. Yes, go ahead.

CAPCOM Okay. For today, we'd like you on P-23 to make a trunnion bias determination prior to P-23 sitings as called out in procedures and also one afterward. Our intent here is to check out the possibility that some sort of thermal effect may be giving you errors in the angular readout in the section. The bias that you get beforehand should be incorporated, that is proceed on NOUN 87 after you get 2 consecutive measurements equal it will then point 003 degrees, and of course move the trunnion off a couple of degrees between the measurements. The Earth should be a lot smaller in your field of view today, I'm sure you're a lot more qualified to tell us about that than we are, but to insure that you're getting a good angle measurement between the star and the Earth horizon, the section M-line, which is the line that runs through the 2 hash marks and is perpendicular to the R-line, should be parallel to the Earth horizon at the substellar point. And then the actual super imposition of the star on the horizon can be made at any point in the field of view of the section above, below, or on the M-line. We recommend the marks be made as rapidly as possible after the AUTO maneuver. If you feel that the amount of time between the AUTO maneuver and the time you get ready to mark is excessive or that you don't like that AUTO maneuver attitude when you get ready to mark, of course you can use a -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 23:59, CDT 8:31 88/1

CAPCOM We've got an auto maneuver attitude when you get ready to mark. Of course, you can use a VERB 94 - that's VERB 94 to get you back to the flashing 51 position to redo the auto maneuvers. Over.

SC Roger. Stand by one, we're going to stop PTC, and then we'll talk about this P23.

CAPCOM Okay.

PAO Apollo 11 is now going out of the passive thermal control mode in which it was slowly rotating to maintain thermal balance. They're getting set up for the P23 activities. That's the midcourse navigation. Capcom Bruce McCandless is passing up some changes in the procedures for this navigational operation.

SC Houston, Apollo 11.

CAPCOM Go ahead, 11.

SC Okay, we're stopping PTC now and maneuvering to our P52 and optics cal attitude. And we're going to the P23. What I was trying to tell you yesterday was about that. The M line is not anywhere parallel to the horizon at the roll, pitch and yaw which you give me to go to for the substellar point, and I was trying to maneuver off to get it parallel to the horizon when you all said that was unnecessary.

CAPCOM Roger, 11. I guess in keeping the cups of coffee strong, why you get that one.

SC Well - okay - well, this morning, let's just see how close it comes to being parallel to the M line. Before we started marking for the first time it appeared that the computation of - of those three angles was somewhat off, and that I was wasting a lot of gas by going to those three angles and then having to make a large attitude changes after that to get the M line parallel, and in some cases it appeared to be just an accepted attitude required, and you all said that it wasn't needed. So I was marking in some cases with the M line not parallel. I thought perhaps you had some processor for computing that offset and making sense out of that data, but as far as I know we gotta have the M line parallel.

CAPCOM Roger, 11. We don't have that capability. We do require that the M line be parallel to the horizon in order to get a good mark. We feel that possibly the - the state vector information that you were using for your maneuver basis yesterday may have needed to be updated a little, and if you'll stand by a second we'll give you an evaluation of what we feel you'll get today by the auto maneuver.

SC Okay.

SC Houston, Apollo 11. Over.

CAPCOM Go ahead, 11.

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 23:59, CDT 8:31 88/2

SC Roger. I'm getting ready to do an O2 fuel cell purge. Do you have any particulars on this, and I assume you want these one at a time, or can I triple up. Over.

CAPCOM We'd like them one at a time, and stand by. I don't think we have any sequence. You can do them in any order you want.

SC Okay.

CAPCOM And, we're watching you on TM down here. We wanted to -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT: 8:46, GET: 24:14, 89/1

SC Houston, Apollo 11. You want to look  
at these TM 93 before I proceed on.  
CAPCOM Yes, please, stand by a second.  
SC Okay.  
CAPCOM 11, this is Houston. On our TM here  
we're only seeing values in 2 registers. Can you read us out  
the contents of register 3, please.  
SC Register 3 minus 3 balls 2 4.  
CAPCOM Roger, minus 3 balls, 2 4, and you  
can go ahead and proceed.  
SC Okay, proceeding at this time.  
CAPCOM 11, Houston, after you've completed  
P52, we'd like the up flight you on state vector, so we can  
start out clean on this P23, over.  
SC Okay. Houston, are you observing the  
higher O2 flow on fuel cell 3? Houston, Apollo 11, it triggers  
the master alarm 3 times now - there it goes number 4. It  
goes up to about 1.4 and then oscillates back down to about  
1.1, over.  
CAPCOM Roger, we saw them 1.3 now, on TM -  
stand by a second.  
SC And we're through now for state vector.  
CAPCOM Roger, give us accept, please.  
SC Roger.  
CAPCOM 11, Houston. On our O2 flow fuel cell 3,  
apparently it was flowing a little higher than the other two  
during purge, but the flow rate is acceptable, over.  
SC Roger, it seems to be flowing a little  
bit more, and actually putting out more current than the other  
two, also, over.  
CAPCOM Roger, we copy. 11, this is Houston.  
We've completed the uplink; computer's yours, and go back to  
block.  
SC Okay.  
CAPCOM Go ahead 11.  
SC Houston, 11, I don't believe we were  
calling you right now.  
CAPCOM Roger, out.  
PAO This is Apollo Control at 24 hours  
22 minutes into the mission. Apollo 11's distance from the  
Earth is 102 436 nautical miles, velocity 5288 feet per second.  
SC Houston, Apollo 11.  
CAPCOM Apollo 11, this is Houston, go ahead.  
SC Roger, I'm in a good attitude here to  
do - I have in the sextant this last P52 star. What number is  
it? Star 37, is that all right for the optics calibration  
to save some gas, are do you want to go over to Star 40?

END OF TAPE

SC - 37. Is that all right for the optics calibration to save some gas, or do you want to go over to Star 40?

CAPCOM Star 37 will be fine for the optics calibration and we haven't noticed a VERB 66 yet after our state vector uplink. Over.

SC Okay.

CAPCOM When you move into P-23, we recommend that you use the CMC computer angles for your auto maneuver. See how that works out. If it doesn't bring you up with the M-line parallel to the horizon to the substellar point, we will see if we can get you some ground computed angles. I guess the big thing here is to make sure that the M-line is parallel to substellar points so we can get a good angular measurement. Over.

SC Yes, I believe.

CAPCOM Roger. Roger.

PAO Star 37 is Nunki. Apollo 11 is now in program 52 which is realignment of the platform prior to beginning the cislunar navigation operation.

SC This is Apollo 11. Marking on this star, I get a 987 twice in a row of five balls so that's sufficient for a count.

CAPCOM That's certainly very sufficient.

SC Okay.

SC Now I want to go to P00 and I am going to take your three angles and do a verify of 49 maneuver to your substellar point. Okay?

CAPCOM Okay. We recommend that for the first star, if we gave you a new state vector, we'd like to try the CMC computed angles for your auto maneuver.

SC Okay.

CAPCOM And have you hit PROCEED on this display to enter the zero?

SC Not yet.

CAPCOM Okay.

CAPCOM 11, Houston. Over the past two hours we have seen a slight continuing increase in partial pressure of CO2. Have you in fact changed the CO2 cannister yet this morning? We don't need to do it right now, but we'd like to confirm it on our instrumentation. Is that in good shape? Over.

SC No, we haven't changed any cannisters this morning.

CAPCOM Okay. Then you can plan on accomplishing that after P-23 is over and you've got the LEB clear.

APOLLO 11 MISSION COMMENTARY 7/17/69, CDT 8:56, GET 24:24 90/2

SC Houston, Apollo 11. We're in process  
of maneuvering to P-23 in desired attitude. It likes  
ROLL 8.37, PITCH 61.22 and YAW 339.87. Over.  
CAPCOM Roger, we copy. And that is for Star  
Zero 1?  
SC Star Zero 1 right near the horizon.  
Code 110.  
CAPCOM Roger.  
SC Houston, Apollo 11. On this star the  
auto maneuver works just fine and I am right at the substellar  
point. Everything looks beautiful except there is no star  
in sight. It is just not visible.  
CAPCOM Roger. Is this for Star 01?  
SC That's correct.  
CAPCOM You are not getting any reflections  
or anything like that that would obscure your vision, are  
you?  
SC Well, of course, the earth is pretty  
bright and the black sky, instead of being black, has sort  
of a rosy glow to it and the star, unless it is a very  
bright one, is probably lost somewhere in that glow, but  
it is just not visible. I maneuvered the reticle considerably  
above the horizon to make sure that the star is not lost in  
the brightness below the horizon. However, even when I get  
the reticle considerably above the horizon so the star  
should be seen against the black background, it still is  
not visible.  
CAPCOM Roger, we copy. Stand by a minute,  
please.  
CAPCOM 11, this is Houston. Can you read us  
the shaft and trunnion angle off the counters?  
SC I will be glad to. Shaft, 331.2 and  
trunion, 35.85.  
CAPCOM Roger, thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 9:16 GET 24:44 91/1

SC It's really a fantastic sight through that sextant. A minute ago, during that auto maneuver, the radical swept across the Mediterranean. You could see all of North Africa absolutely clear, all of Portugal, Spain, southern France, all of Italy absolutely clear. Just a beautiful sight.

CAPCOM Roger, we all envy you the view up there.

SC But still no star.

CAPCOM 11, this is Houston. Over.

SC Roger. Go ahead, Bruce.

CAPCOM On our ground computer we confirm the shaft and trunnion angle that you have as being pointed at the star. However, it looks as if that shaft and trunnion angle is also pointing into the structure of the LM so that while you will be getting the earth horizon, the star LOS, is obscured by the LM. We recommend an auto maneuver to the attitudes in the flight plan. Roll 1772, pitch 2982 and yaw 330.0. Over.

SC Okay, fine, let's try that.

SC Transmission hooked on and gimbal locked on now?

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 9:36, GET 25:04, 92/1

CAPCOM 11, this is Houston. While you're maneuvering, could we get an LM CM Delta P reading from you? Over.

SC Roger. Just a tad under 1, Bruce - .95.

CAPCOM Roger. .95.

PAO This is Apollo Control. That reading was the difference in pressure between the lunar module cabin and the command module cabin.

CAPCOM Apollo 11, Houston.

SC Go ahead.

CAPCOM Is the commander aboard?

PAO This is Jim Lovell calling Apollo 11.

SC This is the commander.

CAPCOM I was a little worried. This is the back-up commander still standing by. You haven't given me the word yet. Are you GO?

SC You've lost your chance to take this one, Jim.

CAPCOM Okay, I concede.

SC Houston, Apollo 11.

CAPCOM Go ahead 11.

SC Okay, our maneuver is complete and at this attitude the M-line is exactly 90 degrees out of phase. It is exactly pointed along the vector toward the center of the Earth instead of being parallel to the right.

CAPCOM Roger.

SC I'm going to hold right here for your next projection.

CAPCOM Roger.

SC Okay, Houston. It appears to be okay now. We've changed our attitude slightly and I have a star and I'm maneuvering to get the M-line parallel.

CAPCOM This is Houston. Roger, we copy.

PAO This is Apollo Control at 25 hours, 20 minutes. Apollo 11 -

SC Houston, stand by.

PAO Distance is now 103,263 nautical miles. Velocity 5,256 feet per second.

PAO This is Apollo Control. Delay that last announcement. Those figures are not based on the proper ground elapsed time. This display is static. We don't have the present numbers.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT: 9:56, GET: 25:24, 93/1

SC Houston, Apollo 11. Are you copying these NOUN 49's that have been going through?  
CAPCOM Yes, we surely are. Let's see, plus .1, and a plus .2 on nautical miles and feet per second.  
Over.

SC Roger.

CAPCOM 11, this is Houston, over.

SC Go ahead.

CAPCOM Yeah, Mike, we show you in - we're in 59 right now, over.

SC That's right. I - I haven't entered, I gave it back to the computer for a second. I put the Mode Switch from Manual back to CMC while I fooled with the DSKY, and the computer drove the star off out of sight, so the delay here has been in going back to manual and finding the star again which I've finally done, and just a second here, I'll go to enter and get a 51 and mark on it. As I say, for some reason the computer drove the star off out of sight.

CAPCOM Okay, roger, out.

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead.

CAPCOM Roger, we show you as a little less than an hour to the midcourse correction number 2 burn, and we recommend that you terminate the B23 activities here, and press on with the waste water dump which we need from you and getting ready for the burn, over.

SC Okay.

CAPCOM And I have your midcourse correction number 2 pad when you're ready to copy.

SC Stand by. Roger, Houston. Apollo 11, ready to copy MCC 2.

CAPCOM Apollo 11, this is Houston. Midcourse correction number 2, SPS G&N 63 zero 59'er plus 09'er7, minus 020, GET ignition 026 44 57 9'er 2 plus 00 118 minus 00 003 plus 00 177 Roll 277.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 25:50, CDT 10:22 94/1

SC 177, roll 277355015, noun 44  
block is A, delta VT 0021300300168, sextant star 302082370,  
the rest of the pad is N/A. GDC align vega and deneb. Roll  
align 007144068, no LH. LM weight 33302. For your informa-  
tion your heads will be pointed roughly towards the earth  
on this burn. Readback over.

SC Roger. Midcourse correction  
number 2. SPS G&N 63059 plus 097 minus 020026445792 plus  
00118 minus 00003 plus 00177277. Are you still copying?  
Over.

CAPCOM Roger. Still copying. Go  
ahead. Apollo 11, this is - Apollo 11, this is Houston.  
I copied your transmission about roll 277, and go ahead  
from roll 277. Over.

SC Roger. 355015 N/A 00213003001  
68302082370. Vega and Deneb 007144068. No ullage. LM weight  
33302. Heads towards the earth. Over.

CAPCOM 11, this is Houston. Readback  
correct. Out.

CAPCOM Apollo 11, Houston. Over.

SC Go ahead, Houston. Apollo 11.

CAPCOM Roger. We'd like you to terminate  
battery A charge at GET 26 hours and reinitiate battery A  
charge after midcourse correction 2. Over.

SC Follow that one, roger.

CAPCOM Roger, out.

PAO This is Apollo Control at 25 hours,  
58 minutes. Apollo 11's distance is now 107,224 nautical  
miles. Velocity 5,106 feet per second.

CAPCOM 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger. If you can give us a  
step we'll send you up a state vector and a target load for  
the maneuver.

SC Okay, give us one minute to check  
the P23 damage.

CAPCOM Sure thing.

SC Houston, Apollo 11. The DSKY's yours.

CAPCOM Houston, roger, out.

PAO This is Apollo Control at 26 hours.

The ignition time for this midcourse correction will be 26 hours,  
44 minutes, 57 seconds - about 44 minutes from now. It will  
be a service propulsion maneuver. Duration of the burn will  
be 3 seconds, the delta-V 21.3 feet per second.

PAO This midcourse maneuver should  
reduce the pericyynthion of Apollo 11's trajectory from the  
present 175 nautical miles to 60 nautical miles.

CAPCOM 11, this is Houston. We've

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 25:50, CDT 10:22 94/2

CAPCOM completed the uplink. The  
computer's yours.  
SC Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 10:37 GET 26:05 95/1

SC Houston, Apollo 11.  
CAPCOM Apollo 11, this is Houston. Over.  
SC Roger. Wonder if you have a star that  
might be a little closer to the direction we're turning than  
the one you gave us.  
CAPCOM Roger. We're going to rework the attitude  
in the sextant star for you in order to improve the high gain  
antenna coverage and we'll have that for you in a few seconds.  
SC Fine, we're already maneuvering in that  
attitude.  
CAPCOM Roger.  
SC Maybe you can make it just the change in  
roll. Apollo 11, over.  
CAPCOM Roger.  
CAPCOM Apollo 11, this is Houston. Over.  
SC Go ahead.  
CAPCOM Roger, on your attitude for the burn  
we'd like you to use roll 096, pitch 356, yaw 018. That  
will give you a sextant star of 01, shaft 253.8, trunnion  
24.2. Over.  
SC (garbled)  
CAPCOM 11, this is Houston. We are having  
difficulty reading you through the noise. Could you read back  
again, please? Over.  
SC Roger, Houston, (garbled)  
CAPCOM Roger, very weakly in the noise, but I  
think I can copy. Go ahead.  
SC Okay, roll 096, 356 018 01.  
CAPCOM Roger, I got all of that except trunnion.  
It's trunnion 242. Over.  
SC Houston, Apollo 11. How do you read me  
now on OMNI A?  
CAPCOM Roger, loud and clear, 11.  
SC Okay, we'll stay on OMNI A for a while  
then.  
CAPCOM Okay. I got all your readback except  
the value for trunnion and if it's 242, confirm please.  
SC Roger, 242.  
CAPCOM Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 10:47, GET 26:15, 96/1

PAO The Guidance Officer reports Apollo 11 is now in the attitude for the midcourse correction.

PAO This is Apollo Control at 26 hours, 27 minutes. Apollo 11's distance from Earth now 108,594 nautical miles. Velocity 5,057 feet per second. We're about 17 and a half minutes away from the midcourse correction.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 26:35, CDT 11:07 97/1

SC Houston, Apollo 11. Could you give us a couple of high gain antenna angles, please?  
CAPCOM Roger, stand by, 11. Roger, 11, pitch minus 35, yaw 0. Over.

SC Thank you.

CAPCOM Okay.

SC Houston, Apollo 11. How do you read high gain?

CAPCOM Read you loud and clear on high gain down here, and everything's looking good from our standpoint for your burn. Over.

SC Okay, Bruce.

PAO This is Apollo Control at 26 hours and 40 minutes. We're just under 4 minutes to the midcourse correction maneuver. Apollo 11's distance from the earth is 109,245 nautical miles. Its velocity is 5,033 feet per second. Spacecraft weight 96,361 pounds.

PAO One minute to the burn. The duration will be 3 seconds. Burning. Shutdown.

SC Houston, burn's completed. You copying our residuals?

CAPCOM Affirmative.

SC And Houston, looks like we saw about 87 or 88 psi on chamber pressure that time. I can't look at that on the ground.

CAPCOM Roger, 11. We'll take a look at that and get back in a few minutes. 11, Houston. On our realtime telemetry we saw 95 to 97 psi on chamber pressure. We'll - we will look at the recordings down here though and get back with you again. Over.

SC Okay, thank you.

CAPCOM And we've copied your residuals, 11.

SC Roger. No, we're not going to check those residuals.

CAPCOM Huh?

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT: 11:19, GET 26:47, 98/1

PAO This is Apollo Control. That was a good burn. The residuals are on the order of a half a foot a second or less, and will not be trimmed. We're showing spacecraft weight now as 96,159 pounds.

CAPCOM Apollo 11, Houston, could we get your DELTA-V counter reading, please.

SC Minus 3.8.

CAPCOM Minus 2.8.

SC 3.8.

CAPCOM Roger, copy, 3.8.

SC Houston, is there anything else you need on the burn status report?

CAPCOM This is Houston, negative, over.

SC Roger, thank you.

CAPCOM Apollo 11, this is Houston, over.

SC Roger, Apollo 11.

CAPCOM Roger. I just wanted to remind you that we haven't noticed on the TM the VERB 66 after the burn. And for your information we played the recorded TV back last night, I believe, after you all turned in for you rest period, and the pictures came out quite well, over.

SC Did you get any usable pictures out of Mila on that first pass?

CAPCOM Not that we've seen. We had word of a voice loop, but Mila reported that they had gotten a minutes worth of TV signal and Goldstone reported that they had gotten about a minutes worth of modulation, but that they weren't able to get anything off of it.

SC Okay, thanks.

CAPCOM Okay, here's another input, Apollo 11, that the Mila data was recognizable as of the pictures, but we don't have any evaluation as to the quality of the pictures, over.

SC Okay.

CAPCOM And for our information, we've been watching a PCO2 again. Did you change a lithium hydroxide canister this morning, over?

SC Yes, we did, and we've been seeing 1.7 percent in the spacecraft ever since.

CAPCOM Roger, that agrees with our data.

SC 1.7 millimeters.

CAPCOM Roger, we copy.

SC Houston, Apollo 11, we're starting our maneuver to PTC attitude.

CAPCOM Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 11:29, GET 26:57, 99/1

CAPCOM 11, this is Houston. Over.

SC Go head.

CAPCOM Roger. From a propellant balancing standpoint, we recommend that you use QUAD, ALPHA, and BRAVO to start the PTC maneuvers. Over.

SC Roger, understand ALPHA and BRAVO.

CAPCOM Roger, out.

PAO This is Apollo Control at 27 hours, Apollo 11's distance now 110 198 nautical miles. Velocity 4984 feet per second.

CAPCOM 11, this is Houston. Over.

SC Go ahead Houston.

CAPCOM Roger. For cryo balancing purposes, we'd like you to turn the heater and oxygen tank number 1 off at this time. Over.

SC Okay, stand by.

CAPCOM Everything else in the CRYO system remains the same.

SC Okay.

SC Okay, we have O2 heater tank 1 off.

CAPCOM Houston, roger, out.

PAO This is Apollo Control at 27 hours, 7 minutes. The crew is now in the process -

SC - is he happy with all those good things?

CAPCOM Oh, EECOM is happy, and after you get PTC set up, we've got a little procedure from EECOM here to check out the O2 flow and the O2 flow sensor in your cabin enrichment. Over.

SC Okay.

SC It'll be awhile, Bruce. We're just now arriving in PTC attitude and we're going to our 20-minute of minding thruster activity.

CAPCOM Roger, we copy. We'll be here.

END OF TAPE

PAO This is Apollo Control. The passive thermal control being reestablished by Apollo 11 is at the rate of three-tenths of a degree per second which would be three rotations per hour.

SC Houston, Apollo 11. Are you going to take control of the OMNI's now and switch us between D and B.

CAPCOM This is Houston. Stand by one.

CAPCOM Apollo 11, Houston.

SC Go ahead.

CAPCOM Mike, how about selecting bravo at this time and I'll give you a comp configuring these, over.

SC That PTC sure worked well last night.

CAPCOM Outstanding.

CAPCOM 11, Houston.

SC Go ahead.

CAPCOM Okay. ROLL for the COMM installation.

Now, that's the antenna on the A and BRAVO, S-band antenna OMNI to OMNI, high gain track to manual and the PITCH is minus 50 and YAW is 270.

SC You may have to repeat some of that James. We've got a LM guy taking care of the high gain right now. Yes, and he is eyeballing the earth. He's got his head out the window.

CAPCOM I understand. I had trouble on 12 with him, too.

SC Say again what you'd like.

CAPCOM Okay, the S-band antenna OMNI A switch to BRAVO which you have now, and S-band antenna OMNI to the OMNI position and the high gain track to the manual position, and the PITCH and YAW angles are minus 50 for PITCH and the YAW is 270.

SC Minus 50 and 270.

PAO That's Jim Lovell, the commander of the backup of Apollo 11 crew communicating with Apollo 11 at the present time. He also commanded the Gemini 12 flight in which Buzz Aldrin was his pilot.

SC Hey, Jim, I'm looking through the monocular now and to coin an expression the view is just beautiful. It's out of this world. I can see all the islands in the Mediterranean. Some larger and smaller islands of Majorca, Sardinia and Corsica. A little haze over the upper Italian peninsula, some cumulos clouds out over Greece. The sun is setting on the eastern Mediterranean now. The British Isles are definitely greener in color than the brownish green that we have in the islands

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 11:40, GET 27:08 100/2

SC peninsula of Spain. Over.

CAPCOM Roger. I understand that the Northern Africa - Mediterranean area is fairly clear today, huh?

SC Right. I see a bunch of roads with cars driving up and down, too.

CAPCOM Do you find that the monocular is any good to you, Buzz?

SC Yes. It would be nicer if it had another order of magnitude of power on it. It has a tendency to jiggle around a little bit and you might want to have some sort of a bracket. I hate to use that word though.

SC There's an anti-cyclone going in the southern hemisphere southeast of Brazil and some - well, the diameter of it must be over 2 000 miles across.

CAPCOM How does the weather look up in the southern part of the western hemisphere or up in the United States area?

SC Well, you all are just beginning -

END OF TAPE

SC United States area.

SC You all are just beginning to come over the LM now I can see parts of Central America and it looks to be fairly clear there. The islands in the Caribbean are beginning to come in and rather a few streaming lines of clouds. Looks like there is a system up to the - well, off of Greenland that has some large cloud streamers extending back down to the southwest. The east coast of the U.S. is just coming into view now and it doesn't look too bad that I can see right now. We may have some pretty good shots later on this afternoon Over.

CAPCOM Roger, thank you.

PAO That was Buzz Aldrin giving the description of what he could see on the Earth. The backup lunar module pilot Fred Hayes is also in the Control Center at the present time.

SC Houston, Apollo 11.

CAPCOM Go ahead, 11.

SC I've got a comment about the point on the Earth where the sun's rays reflect back up toward us. In general, the color of the oceans is mostly uniform and it's, oh bright and darker blue except for that region that's about 1/8th of an earth's radius in diameter, and in this circular area the blue of the water turns a grayish color and I'm sure that's where the sun's rays are being reflected back on up toward us. Over.

CAPCOM Roger, Buzz. We noticed the same thing. It's very similar to looking at a light shining on something like a billiard ball or bowling ball. You get this bright spot in the blue of the water and that turns it sort of a grayish color.

SC Yes. Is there a Navy term for that?

CAPCOM A lot of gray paint.

CAPCOM 11, Houston.

SC Go ahead, Houston.

CAPCOM Mike, are you satisfied with P23 now?

SC Yes, I'm happy with the last updates we got, you know, in terms of what it did to our state vector. Still not altogether happy with the various procedures. If we could pick stars within the smaller range of trunnion angles so that you could allow P23 to pick its own maneuver and go to that substellar point and then have that star visible, that would seem to me to be the simplest and best way to do it.

CAPCOM How about the horizon now? Is it pretty well defined where it's no longer hazy?

SC Yes, we're far enough out now that the - I think the horizon definition variation is lost in the noise.

SC Hey, Jim.

CAPCOM Go ahead, Buzz.

SC Looks like the best outstanding view is through the monocular is just steady it out and let it close when it's in front of your eye and then you kind of float up next to it so you're not touching it at all. It has a very slow drift and you get a better view that way.

CAPCOM Sounds good.

CAPCOM How does it feel to be airborne again, Buzz?

SC Well, I'll tell you, I've been having a ball floating around inside here, back and forth up to one place and back to another. It's just like being outside except more comfortable.

CAPCOM It's a lot bigger than our last vehicle.

SC We've been busy, I'm looking -

SC Say again, my friend?

SC It sure is nice in here.

CAPCOM I said it's a lot bigger than the last vehicle Buzz and I were in.

SC Oh, yes. It's been nice. I've been very busy so far. I'm looking forward to taking the afternoon off. I've been cooking, sweeping, and almost sewing, and you know, the usual little housekeeping things.

CAPCOM It was very convenient the way they put the food preparation system right next to the NAV station.

SC Everything is right next to everything in this vehicle.

SC Not if you're in the (garbled)

SC Jim, it's been a little warm in the machine throughout yesterday and last night during the PTC. It cooled off somewhat with the windows buttoned up and -

END OF TAPE

SC - the PTC. It cooled off somewhat with the windows buttoned up and we've seen suit temperatures of about - the high 40's and cabin temperatures in the low 60's. But this seems to be still a little bit on the warm side.

CAPCOM I understand it got a little warm during the day and cooled down a little bit when you put the shades up, but you're still a little bit warm. Have you have any moisture condensation or anything like that on the wall?

SC No, we haven't been able to detect any moisture anyplace in the spacecraft. It seems to be fine.

SC One of the hydrogen filters - the one that we've got on the hot water - seems to keep flowing when you remove one of the food bags from it. Its flow rate is quite small right near the end of one out, and that contributes a little bit of moisture to the atmosphere.

SC Yes, that hydrogen thing, it's, I'm not sure, but I think it's a back pressure problem. If the thing sees any back pressure at all, like when the bag is attached, well the flow rate will slowly decrease to where its almost zero, and you wait, and you wait, and you wait for that last ounce. You think you have it, and you remove the bag, and then you very rapidly thereafter see maybe a glob the size of a dime or a quarter come out and just hang there. That appears to be true even though the opening into the bag is not restricted.

CAPCOM Understand.

SC In general, I think they do quite a good job, especially on the guns when we're moving a lot of the hydrogen bubbles.

CAPCOM Are the water temperatures good? Are you getting hot water?

SC Yes, it seems reasonably warm.

SC We made 3 cups of coffee today. The last one - you know when all the plumbing was warmed up, the hydrogen gun and everything, was warmest of the 3. I don't know who had that one - Neil, did you have that one? How was your coffee? You didn't drink it till later, did you? Anyway, it's pretty good. It's not piping hot, but it beats stone cold coffee.

SC Jim, we've been sitting here a little over 20 minutes now. How does the thruster firing activity look? Are you ready to go on with this PTC?

CAPCOM Roger, stand by.

CAPCOM We're all set to go, Mike.

SC Okay, I'll press ON then.

SC Houston, Apollo 11. PTC has started and it looks good.

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 12:01, GET 27:29, 102/2

CAPCOM 11, Roger. This is Houston. Roger,  
out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 12:11, GET 27:39, 103/1

PAO This is Apollo Control at 27 hours  
46 minutes. Apollo 11's distance from the Earth is now  
112,386 nautical miles, velocity 4,906 feet per second. We  
now have the actual numbers on the midcourse correction  
maneuver. Ignition time was 26 hours 44 minutes 57.92 seconds.  
Duration of the burn was 2.91 seconds. DELTA-V 20.9 feet  
per second.

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead, Houston.

CAPCOM Roger, if you're free for a couple  
of minutes, we have a procedure here that will let us verify  
the O2 flow transducer, and at the same time get some more  
of our cabin enrichment out of the way, over.

SC Stand by.

SC Go ahead Houston, we're ready to  
copy.

CAPCOM Roger, the primary purpose of this  
is - as I mentioned, to let us check out your O2 flow trans-  
ducer. However, we still need about 2 hours worth of cabin  
enrichment, so we'd like to keep the - the vent that we're  
going to set up going for this purpose. Okay, we want you  
to install the cabin -

END OF TAPE

CAPCOM - for this purpose. Okay, so we want you to stall the cabin vent quick disconnect which you'll find in compartment R6, that is Romeo 6 on the urine connector on panel 251. When this is completed verify that the waste stowage vent valve is closed and then open or position the waste management overboard drain to the dump position. Over.

SC Okay, understand that - install the cabin quick disconnect out of R6 on the 251 urine connector and verify that the waste dump valve is closed, and say again the last part.

CAPCOM Roger. And then put the waste management overboard drain valve off into the dump position. Over.

SC Roger. Put the waste management overboard drain valve to the dump position.

CAPCOM Right. That's the one down on panel 251 also. And we'll watch your O2 flow on telemetry down here.

SC Okay, Houston. This is the configuration to set up.

CAPCOM 11, this is Houston. Say again, please.

SC You do have the O2 flow transducer checked out - the set up accomplished.

CAPCOM Okay, understand you have opened the drain valves this time.

SC That's affirmative.

CAPCOM Roger. We're not getting telemetry data from you right due to low signal strength. There it comes back. I expect it'll probably take us anywhere from 15 minutes to half an hour or so. I see an increase in O24 due to the size of the cabin and of course of the small size of the drain. Over.

SC Alright.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 12:36 GET 28:04 105/1

SC Houston, Apollo 11.  
CAPCOM Go ahead 11.  
SC Roger. I've got the world in my window for a change and looking at it through the monocular it's really something. I wish I could describe it properly. The weather is very good. South America is coming around into view. I can see on the - what appears to me to be upper horizon a point that must be just about Seattle, Washington, and from there I can see all the way down to the southern tip of Tierra del Fuego and the southern tip of the continent.  
CAPCOM Roger, sounds like you've got a beautiful view up there.  
SC Absolutely fantastic. I hope the pictures come out. We're rotating around where's it's going out of view again.  
PAO That's Mike Collins talking.  
SC We'll pick it up again in a second.  
CAPCOM Sounds like one of these rotating restaurants.  
PAO And Bruce McCandless is back on the CAPCOM console now.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69, CDT 12:46, GET 28:14, 106/1

CAPCOM Apollo 11, this is Houston. Over.  
SC (inaudible)  
CAPCOM Apollo 11, this is Houston. Negative. We had a command computer at the Madrid go down. We had to switch over to ascension temporarily. We're now back remoting through Madrid and the computer is back, and we're ready to resume control of your OMNI's and full communication. Over.  
SC Okay, you've got it.  
CAPCOM Okay. One thing that we did miss in the dropout in the noise here is your LM-CM DELTA P readings for about 28 hours GET. Over.  
SC Okay. LM-CM DELTA P is .98.  
CAPCOM Roger. 0.98, and what have you been reading for O2 flow on your onboard gage? Over.  
SC Well, right now, after we put that gadget in, we've got about .35. Before that, we were reading on scale level. I think ours is relatively correct, at least when time comes for the water simulators to kick in at 10 seconds, it goes on up to about .75, .8, something like that.  
CAPCOM This is Houston. Roger, out.  
CAPCOM 11, this is Houston. Oh, more information based on our analysis of your last SCS burn, it looks like you got a good solid burn there. We show 94 PSI chamber pressure -

END OF TAPE

CAPCOM It looks like you've got a good solid burn there. We show 94 psi chamber pressure, and it looks like the SPS is definitely GO, over.

SC Good to hear it.

CAPCOM Roger, we thought you'd feel that way about it.

SC We're right in the middle of either (garbled) or salmon salad, or something like that. That's probably why we're not answering you right away.

CAPCOM Okay, well we don't want -

SC My compliments to the chef, that salad salmon is outstanding.

CAPCOM Roger, understand that's the salad salmon, over.

SC Something like that, salmon salad.

CAPCOM There we go, the salmon salad, very good.

SC Okay, Houston, coming up on the water accumulator activity, and it's going on up to .85, oh, about .95 and it reached a peak there and then gradually dropped back on down to .6 now, .4, and it looks like it's pretty well - here we are leveling off back down to .35, over.

CAPCOM Roger, we're copying that.

PAO At 28 hours 40 minutes, we're showing Apollo 11's distance as 114 922 nautical miles from Earth, velocity 4,819 feet per second. The crew is eating lunch at the present time, and it sounds like there music in the background that they are enjoying during their lunch period.

CAPCOM Apollo 11, Houston.

SC Go ahead.

CAPCOM Roger, on that O2 flow transducer down here on telemetry our values are agreeing pretty well with what you read out onboard, and the EECOM's have been noticing this cycle, but it still looks like the indicated rate is lower than what we would expect. We're still working on the problem, and we'll let you have a more complete diagnosis on it in a little while.

SC Okay, it's a tight fix then.

SC We run a tight ship.

CAPCOM Roger, is that music I hear in the background?

SC Buzz is singing.

SC Pass me the sausage, man.

CAPCOM Okay.

PAO This is Apollo Control at 29 hours into the mission. Apollo 11's distance from Earth is now 115 837 nautical miles, velocity 4,788 feet per second. Spacecraft weight 96 117 pounds.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 14:11 GET 29:39 110/1

PAO This is Apollo Control at 29 hours 40 minutes. Apollo 11's distance from Earth 117 682 nautical miles, velocity 4726 feet per second.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, this is Houston. As a result of our venting through the waste management drain we concluded that your O2 flow rate sensor is in fact malfunctioning. I mentioned when you start this through the cyclic water accumulator dump that even though it was moving, probably indicating a higher flow rate, it didn't seem to be indicating a flow rate that is high enough, and based on that and the flow that we're getting right now we concluded that the transducer is malfunctioning. We'd like to continue the O2 flow for about another hour, shutting off at about 31 hours GET to get the O2 concentration in the vehicle up in the vehicles where it will be acceptable for the LM checkout. Over.

SC Okay. Does it look to you like it just has a bias on it?

CAPCOM Roger, 11. It does seem to bias. Looks like it has a fairly high threshold before it stops indicating. ECOM seems to think that for high flow rate purposes it will still give you a relative indication during the mission. Over.

SC Okay, we understand. Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 14:32, GET 30:00 111/1

PAO This is Apollo Control at 30 hours into the mission. Apollo 11's distance from earth is 105 853 nautical miles, velocity 4233 feet per second. And that was Neil Armstrong conducting a conversation with CAPCOM Bruce McCandless on the O2 flow rate transducer

PAO This is Apollo Control. We have a correction on those last distances and velocities. That distance and velocity is in reference to the moon instead of the earth. To the moon - Apollo 11's distance from the moon is 105 729 nautical miles at the present time and the velocity in reference to the moon is 4230 feet per second.

CAPCOM Apollo 11, this is Houston. We would like you to start terminating charging on Battery A at GET 30 plus 15. Over.

SC Okay. GET 30 plus 15, Battery A charge terminated.

CAPCOM Roger. Out.

PAO This is Apollo Control. Apollo 11's distance from the earth is 119 116 nautical miles. Its earth referenced inertial velocity, 4679 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, GET 30:14, CDT 14:46 112/1

PAO This is Apollo Control. Based on the present projectory, Apollo 11 will enter the lunar sphere of influence as an elapsed time of 61 hours, 39 minutes, 58 seconds.

CAPCOM Apollo 11, this is Houston.  
Over.

SC Go ahead, Houston.

CAPCOM Roger. If you're free for a minute I'll get some updates to the P37 pad that we passed up to you yesterday afternoon, I guess. As a result of doing midcourse correction number 2 the delta-V required in the TLI plus 35, '44 and 53 pads have changed slightly. Over.

SC Roger. Standing by to copy.

CAPCOM Okay, TLI plus 35 pad, the delta-VT should be 7 and 992 instead of 8016, TLI plus 44 it should be 6112 instead of 6141, and TLI plus 53 it should be 8172 instead of 8209. Readback. Over.

SC Roger. Understand. 7992, 6112, 8172. Over.

CAPCOM Roger. Readback correct. Out.

PAO This is Apollo Control. Goldstone reports they are receiving TV from the spacecraft and are recording it.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, this is Houston. Goldstone reports they are receiving a TV picture coming down from you all - a little snowy but a good TV picture. Over.

SC Roger. We're just testing the equipment up here.

CAPCOM Roger.

SC Ask them if they can read the numbers.

CAPCOM Okay, stand by. Goldstone, this is Houston Capcom. Over.

GOLDSTONE Houston Capcom, Goldstone M and O go ahead.

CAPCOM Roger. Stand by a minute, Goldstone. 11, this is Houston. What numbers are you referring to? Over.

END OF TAPE

CAPCOM This is Houston. What numbers are you referring to? Over.

SC Well, I guess if they can't see any numbers, why it's kind of a lost cause.

CAPCOM Negative. Stand by. We want to do them. We wanted to know what numbers before we asked them.

SC Okay, I'm showing them a DSKY and I'd like to know whether they can read what's showing on the DSKY and also whether they can see PROG VERB and NOUN. Over.

CAPCOM Roger. Stand by a second. Goldstone in on all Houston Capcom. Over.

SC Capcom, Goldstone, go ahead.

CAPCOM Roger. Did you copy the spacecraft request?

SC That's affirmative. I am reading the numbers on our monitor here.

CAPCOM Okay, that's ...

SC Roger, that's both the numbers on the DSKY itself and the little words like program and verb, noun, computer, activity, things of this sort.

CAPCOM Roger, I can read the numbers clearly. We can't distinguish what the words are because it is a little snowy.

SC Roger.

CAPCOM Okay, you read verb, noun, and program.

SC Roger, do you see over in the left-hand corner there's a big square one that says computer activity, comp activity.

CAPCOM Roger, I see a flash occasionally in that area.

SC That's the one.

CAPCOM Okay, it looks like he's moved the camera at this time.

SC Roger.

CAPCOM 11, this is Houston. Goldstone M&O reports that they can read the numbers on the DSKY. They can also read the verb, noun, program, and see the comp activity light flashing. Over.

SC Very good. Thank you.

CAPCOM And they also report you appear to have panned the camera over to another location now.

SC Yeah, we're going to work on something else.

CAPCOM Roger.

PAO This is Apollo Control. We do not have lines called up between here and Goldstone at the

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 30:31:00, CDT 15:03 113/2

PAO present time, so we cannot receive the pictures in Houston. Goldstone is recording. The lines will be up for the scheduled TV pass, approximately 6:30 this evening, Central Daylight Time.

PAO This is Apollo Control. The tape from this unscheduled TV pass will probably be fed from Goldstone to Houston following the regularly scheduled TV transmission this evening.

END OF TAPE

SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Oh Charlie, that you?  
CAPCOM That's me, how are you there?  
SC Oh, just fine. How's the old white  
team today?  
CAPCOM Oh, the old white team's bright eyed and  
bushy tailed. We're ever alert down here.  
SC Ever alert and ready. Hey you got  
any medics down there watching high grade? I'm trying to  
do some running in place down here. I wondered just out  
of curiosity whether it makes my heart rate up.  
CAPCOM Well, they will spring into action here  
momentarily. Stand by.  
CAPCOM Hello 11, we see your heart beating.  
SC Okay well (garbled) we're all running  
in place up here. You wouldn't believe it.  
CAPCOM I'd like to see that sight. Why don't  
you give us a TV picture of that one.  
SC I think Buzz is trying. He got it.  
CAPCOM Okay, it's coming in at Goldstone,  
Buzz. As Bruce said, we don't have it here in the center.  
SC (garbled) didn't help out the CPC  
very much.  
SC I don't know whether it's a vibration  
or what it is, but it makes the pitch and yaw rate needles  
on FDAI number 1 jump up and down a little bit when we  
jump up and down.  
CAPCOM Rog, Rog, Goldstoners say they see  
you running there, Mike.  
SC Okay.  
SC Ask him what he's running from.  
CAPCOM 11, Houston. Mike we see about a  
96 heart now.  
SC Okay, thank you.  
SC (garbled) without getting (garbled).  
CAPCOM Rog, we copy.  
SC Goldstone should be getting about the  
best picture of the earth we can give them right now, Charlie.  
CAPCOM Roger, Mike, thank you much.  
SC We've got a little distortion in the  
horizontal direction from banding on our monitor. I wonder  
if they're getting the same thing?  
CAPCOM Stand by Buzz. I'll let you know.  
SC I guess it would be more described  
as a waviness.  
GOLDSTONE Goldstone MNO, Houston, Capcom.

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 30:51, CDT 15:23, 114/2

GOLDSTONE Goldstone MNO.  
CAPCOM Okay, the crew is complaining of some horizontal banding on their monitor. Do you see that on the picture.  
GOLDSTONE Stand by.  
GOLDSTONE They don't see it right now. We don't have anything in focus, Charlie.  
CAPCOM Roger, he's checking on it. I'll see if they had it earlier, stand by.  
SC I guess when we're showing the DSKY, or when we're showing the earth might be a better time.  
CAPCOM Okay.  
GOLDSTONE Houston Capcom, Goldstone.  
CAPCOM Go ahead.  
GOLDSTONE Okay, our TV people confirm they see this horizontal band.  
CAPCOM Okay.  
CAPCOM Eleven, Houston. The Goldstone TV people also see the banding when, at the same time you do, over.  
SC Okay, would they call it a horizontal waviness, instead of banding, maybe?  
CAPCOM I'm not talking to them directly. Stand by Buzz let me see how they describe it.  
CAPCOM Goldstone MNO, Houston Capcom. Could you put the TV guy on the loop please?  
GOLDSTONE Capcom, Goldstone, roger.

END OF TAPE

PAO This is Apollo Control at 32 hours 21 minutes. During the Change of Shift Press Conference we had about 3 minutes of conversation with the crew. During that conversation, Buzz Aldrin reported on - what appeared to be a weather disturbance off Cuba and the Caribbean and we also had some descriptions from Aldrin on the view of Earth from the spacecraft's present position. We'll played that back for you now and then stand by for any further live conversation with the crew.

SC You sure do get a perspective in this thing in Zero G? Right now Neil's got his feet on the forward hatch and he can with his arms reach - oh - five windows. He can reach down into - oh, the LEB where the overboard drain is. He can practically reach over in the cockpit.

CAPCOM Sounds like plastic man to me.

SC I'm hiding under the left hand couch trying to stay out of his way.

CAPCOM Be a good idea, Mike.

SC All right Houston, Apollo 11. Do you have a cloud over the Houston area right now?

CAPCOM Roger. We just had really big thunderstorm here about a hour ago. Couple of storms around the area right now.

SC Yeah, I see one fairly large and isolated one. There are couple of more off to the left but this one looks fairly good size. It could very well be the one that just passed over you. It looks like the Cape has been having a little bit of rain too.

CAPCOM Roger. The one we had here came in from the west and is moving east or nearly so as far as I could tell.

SC Have news, this sextant is fantastic. I can see Alaska right up - right up along the LM and I am running the cross hairs right now down the coast of California, west coast of Mexico, Yucatan Peninsula, up around the Gulf, Florida, Cuba, down Central America and I'm running into the South now.

CAPCOM Roger. It sounds like a pretty fantastic view.

SC The guys in the weather office out at Patrick wanted a report on the top but I guess all we can say is that we are above them.

CAPCOM Rog. We'll pass it on OMEGO.

SC Houston, do you see any predominant weather systems as far as funnel type? Any buildup of tropical storm type? Over.

CAPCOM Not any large ones. There are a couple of smaller disturbances - there is one maybe 300 miles north of Cuba but it doesn't look like ...

CAPCOM Rog.  
CAPCOM Hello Apollo 11, Houston. We got a PV attitude for you and also an update to your CMC erasable load and your alternate contingency check list if you can break that out too over.  
SC Roger, - I am not sure I caught all of that.  
CAPCOM Roger, 11, if you will break out your alternate and contingency check list for the CSM, we got an update to some of the erasable loads on page F2-20, over.  
SC Okay, we will be getting that out and you can give us the attitude for the (garble)

APOLLO 11 MISSION COMMENTARY, 7-17-69, CDT 16:53, GET 32:21:00 117/2

CAPCOM Roger 11. Your TV attitude will be roll 261, pitch 090, yaw 000. High gain angle pitch plus 28, yaw 271. That puts the left-hand window pointed at the Earth. We recommend exiting PTC with your updated procedure in the check list. Over.  
SC Roger. We copy roll 21 - 261, pitch 090, yaw 000, high gain pitch plus 28 Yaw 271. (garble) Over.  
CAPCOM That's affirmative.  
SC Charlie, I have a couple of questions on the PTC. It seems to me that the easiest way to stop it would be - we're essentially on course at 0 degrees yaw and close to up a 90 degree pitch. It is just a question of stopping at 260 roll roughly and how about for a procedure going manual attitude three to REG command and then seeing how our deadband has already collapsed, I will turn on our Panel 8 RCS thrusters at which time it should stop at whatever attitude it binds itself in and if I will do all of that as it comes up on 261 degrees roll we should stop right there - in that position.  
CAPCOM Sounds pretty good. Stand by one  
SC In other words, it might save on gas  
SC Houston, Apollo 11. What page do you want in that revision, Over.  
CAPCOM Roger, 11, if you will turn to page F2-20, over.  
SC Okay.  
CAPCOM Roger, 11. Under Column A on page F2-20, line 5 - line 05. The new data is 01042, line 07, the new data is 00256. Skipping down to line 11 - 00070, line 12 is 00042, line 13 - 77730. In column

END OF TAPE

CAPCOM 13 per 77730. In column Bravo, lines 3, 4, and 5, which are blank should be all zeros. Line 3, line 4 is 20017 line 5 20616, over.

SC Roger (garbled) S-band -20 column Alpha 05 01242 07 2056 11 I'll say again 1100070 1200042 1377730 column bravo 0300000 04 2001705 0616, over.

CAPCOM Roger good read back, and stand by Mike, coming out of the PTC recommendation, over.

SC Okay.

CAPCOM Hello Apollo 11, Houston, with a recommendation on the exiting PTCM, over.

SC Go ahead.

CAPCOM Roger, Mike. We'd like to see you go to excell command on the manual attitude switches. Then to turn on the auto RCS select switches, and then go right to manned. That will prevent us from firing jets uncoupled, over.

SC Okay, fine and I would guess go right command and roll first and then followed by pitch and yaw.

CAPCOM Okay, that sounds good if, and when you get to the roll attitude desired just go right command at that time and that'll stop us right on.

SC Yea I agree Charlie, that sounds right.

CAPCOM Rog.

PAO This is Apollo Control at 32 hours 39 minutes. This is a relative quiet period in the flight plan. The crew will be getting the spacecraft set up for the passive thermal control termination, and the Television transmission. Capcom Charlie Duke has just put in a call. We'll pick that up.

CAPCOM Playing with the P37 while ago and we collapsed the dead-band back down. The dap assumed that the dead band was centered around the new attitude that we happened to be at at that time. Since then we've drifted out a couple of degrees in both pitch and yaw from that attitude, such that if we did the procedure as we call it up to you of going excell command, turning on all of the auto RCS select switches and the rate command it would attempt to fly back to the pitch and yaw attitude that it had when the dead band collapsed. We can prevent that by just immediately priod to going to right command on the manual attitude switches, if you cycle the spacecraft control switch to SCS, then back CMC, over.

SC Sounds like a winner.

CAPCOM Okay.

SC I'm not going to let these LM guys play

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 32:31, CDT 17:03, 118/2

SC with my DSKY any more.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 32:41, CDT 17:13, 119/1

SC I'm not going to let these LM guys  
play with my DSKY any more.

CAPCOM You sound like you'd better protect  
it. It looks like just about anything that you do with that  
DSKY is going to collapse that bad dead band back down.

SC Understand.

SC Charlie we just had to turn in  
61 degrees roll and it looks like whoever figured it out did  
a good job. It's right there in the middle of window number 1.

CAPCOM Sounds great.

SC It looks like Houston's got a little  
smog over it, Charlie.

CAPCOM We've got a constant over-cast here  
in the room - - stand by.

SC - course a little cloud from up here,  
probably covers 8 or 10 states.

CAPCOM Apollo 11 Houston, some of our guys  
just came in from outside and said that is pretty clear over  
the center here it's cleared up completely. All the storms  
have moved on.

SC Contengient.

SC Oh yes Charlie, I can see (garbled) now,  
and I can see the coast line is clear and those clouds  
are just inland a few miles.

CAPCOM Okay, we copy.

SC Looks like the south east part of the  
country is all socked in. California looks nice, the San Joaquin  
Valley shows up as a real dark spot with a lighter brown  
around the side of it. You can't tell that it's green, it  
looks just sort of dark gray or maybe even a real dark blue.

CAPCOM How does the Mojave look? Is it  
clear?

SC Yea, as usual. It looks like the clouds  
just to the west of the Serras, northeast of Bakersfield a  
little bit and crossing over into the Mojave from Bakersfield  
looks clear and then as you get on - -

END OF TAPE

SC Rog. Seeing about what - It looks like there are some clouds just to the west of the Sierras, northeast of ... a little bit and then crossing over into the Mojave from ... it looks clear and then as you get on further to the southeast of there, there's a few clouds.

CAPCOM Roger, 11. Can you pick out Edwards in the sextant? Over.

SC I can see a 104 taxing out takeoff on the runway.

CAPCOM Man, that's super.

SC Those damn bastards almost always have a 104 taxing out for takeoff.

CAPCOM 11, Houston. Can you pick out anything around Edwards, a dry lake or anything? Over.

SC Negative, Charlie. I just - I don't have that resolution, but to give you some idea, I can, in the lower sextant scope, I can see, after knowing what I'm looking for, I can see Padre Island. I can just barely make out the fact that there's a thin slit of land and then there's a little dark zone which is the Laguna Madre between it and the mainland.

CAPCOM Roger, 11. That's pretty significant. Thank you much, Buzz.

SC Right.

PAO Mike Collins is sending us this description from about 126,000 miles from earth.

SC How far out are we, Charlie?

CAPCOM Stand by. I'll give it to you exactly. Looks like about 130,000, but stand by.

SC Okay.

CAPCOM 11, Houston. The exact range is 125,200 miles, and you're traveling 4,486 feet per second.

SC Pretty far and pretty slow; just passed halfway.

SC Hey Charlie, what the latest on Luna 15?

CAPCOM Say again, Buzz. Over.

SC Roger. What's the latest on Luna 15?

CAPCOM Stand by. I'll get the straight story for you.

END OF TAPE

ALL DEAD AIR  
END OF TAPE



PAO This is Apollo Control at 33 hours, 41 minutes. We are going to be standing by here in Mission Control for the possibility that the crew would want to transmit that television pass early. The scheduled time for it was 6:47 Central Daylight time and about 15 minutes was scheduled. That would be at a ground elapsed time of 34 hours and we will have the system set up here in Mission Control to receive and release television should the crew decide to send us the transmission early.

PAO This is Apollo Control at 33 hours, 45 minutes and we do have a correction to the time given for the beginning of that TV nominally. The flight time is beginning at 34 hours to 34 hours, 15 minutes ground elapsed time. The previous conversion of that, that we gave you for Central Daylight Time was in error, it should be 6:32 P.M. Central Daylight Time beginning, assuming we start as the flight plan nominally has a transmission listed at 34 hours ground elapsed time. At the present time, Apollo 11 is 128 431 nautical miles from earth and the velocity continuing to drop off slowly, now reads 4386 feet per second.

SC Houston, Apollo 11. We've stopped PTC, we're in the right position, we're setting up the TV.

CAPCOM Roger.

PAO You've heard that comment from the crew. They've stopped their passive thermal control, they're starting up the TV and we'll be standing by for - for a picture.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, CDT 18:21, GET 33:49:00 124/1

CAPCOM Apollo 11, Houston. We have you stopped in the PTC. Attitude looks good to us. In fact, I would like to get a contact. The last couple of the transmissions from the spacecraft has been garbled from especially Buzz. Could you both give me a com check over.

SC Roger Charley, Buzz here. How do you read?  
1 2 3 4 5 - 5 4 3 2 1.

CAPCOM Roger, you are about 4 by with a slight decrease/increase in volume - sort of a weighty volume to it over.

SC Okay, I moved my mike around. How about now? Is it any better?

CAPCOM Hey that's beautiful right there. Thank you.

SC Okay, Charlie. 1 2 3 4 5 - 5 4 3 2 1.  
How do you read me?

CAPCOM Roger, five by. Is Neil on -

SC - 1 2 3 4 5 - 5 4 3 2 1.

CAPCOM Roger Neil, you five by.

PAO This is Apollo Control at 33 hours 57 minutes and we are less than 3 minutes now from the scheduled television transmission. From Apollo 11, we are continuing to standby for that. We have also been asked to advised that the Delta launch of INTELSAT III scheduled for Friday night at 10:00 PM has been postponed for 24 hours. As a repeat, the Delta launch of INTELSAT III scheduled for Friday night at 10 PM has been postponed for 24 hours. Further details on that will be available in the News Center.

END OF TAPE

CAPCOM Hello, Apollo 11, Houston. We got the network all configured for the TV. You can start any time you want. Over.

CAPCOM Okay, 11. We have a picture. We see the earth right in the center of the screen. Over.

CAPCOM Okay, 11. We have a picture. We see the earth right in the center of the screen. Over.

SC Roger, Houston; Apollo 11. Calling in from about 130,000 miles out. And we'll zoom our camera in slowly and get the most magnification we can. Over.

CAPCOM Roger.

PAO This view is coming to us from about 129,000 nautical miles.

CAPCOM 11, Houston. The definition is pretty good on our monitor, here. The color is not too (garbled) at least on this set. Could you describe what you're looking at. Over.

SC You're seeing Earth, as we see it, out our left-hand window, just a little more than a half earth. We're looking at the eastern Pacific Ocean, and the north half of the top half of the screen, we can see North America, Alaska, United States, Canada, Mexico, and Central America. South America becomes invisible just beyond the terminator or inside the shadow. We can see the earth's ... a definite blue cast. See white bands of major cloud formations across the earth and can see coastlines, picked out the western US, San Joaquin Valley, the Sierra mountain range, the peninsula of Baja, California, and we see some cloud formations over southeastern US. There's one definite mild storm southwest of Alaska. Looks like about 500 to 1,000 miles and another very minor storm showing the south end of the screen near the - Oh, a long ways off of the equator, probably 45 degrees at a more south latitude. Can pick out the browns in the land forms pretty well. Greens do not show up very well. Some greens showing along the northeastern - northwestern coast of the United States and northeastern coast of Canada.

CAPCOM Roger. It's a pretty good picture of clarity, here. We're having - Can you tell us It appears to us that there are two of the same cloud formations trending eastwest. One approximately along the equator, and one around 30 or so south latitude. Can you tell us exactly where those cross the land masses? Over.

SC Yes. They cross just south of the lower part of Mexico, probably through Central America. That is the equatorial band which we assume to be the intertropical convergence zone. Another band, which stands about 30 south correctly seems to appear to join equator

SC at the far left, or just beyond the horizon on the left edge of earth, or at least it looks like it's going to China. We don't have an explanation for that banding.

CAPCOM Roger, Neil. Thank you.

SC It also appears that just to the left of the terminator, up in the northern hemisphere, there's a cloud band trending a gap in the cloud, trending northwest southeast. It appears to us that that comes in about over the northern United States, or perhaps the Central United States. Is that about correct? Over.

SC I can see on the monitor the thing you were talking about but right now I can't get my eye to the window to pick out just where it crosses the shoreline.

CAPCOM Roger.

CAPCOM You guys are doing a good job. It's a real steady picture, here. We're - clarity is excellent. The color, it's - the clouds are - the whites are distinct. The rest of it looks like, to me anyway on the monitor I'm observing is a fairly greenish-blue is the way I'd describe it. Over.

CAPCOM It appears that the -

SC We can't observe much green from the spacecraft.

CAPCOM Roger. On this monitor, the land masses appear to be just a darker grayish color rather than a brown.

SC Well, it's true that we do not have the depths of color at this range that we enjoyed at 50,000 miles out. However, the oceans still are a definite blue and the continents are generally brownish in cast, although it is true that they're tending more toward gray now than they were at the closer range.

CAPCOM Roger, 11. We've been - I've just been vectored to another monitor and sure enough, the browns are coming in a lot more distinctly on the ... that we have up on our screen in the control center. Over.

SC Okay. Well, hold on to your hat. I'm going to turn you upside-down.

CAPCOM 11, that's a pretty good roll there.

SC Oh, I'd say sloppy, Charlie. Let me try that one again.

CAPCOM You'll never beat out the thunderbird.

CAPCOM Apollo 11, Houston. That practice did you some good. It's looking real smooth roll, there.

SC Oops.  
CAPCOM Spoke too soon.  
SC I'm making myself seasick, Charlie,  
I'll just put you back right-side-up where you belong.  
CAPCOM Roger.  
SC You don't get to do that everyday.  
CAPCOM 11, Houston. Could you describe,  
from your view, the polar cloud cap. It appears to us to  
extend down the western coast of North America. Would you  
estimate how far it extends down. Over.  
SC Trying to fit everybody into  
the window. It appears that the cloud cap comes down a  
little bit belong the southern extremity of Alaska.  
CAPCOM Roger. We've - 11, we've lost  
our picture here, now.  
CAPCOM Okay. Apollo 11, Houston.  
We've got the picture back now.  
SC Unfortunately, we only have one  
window that has a view of the earth and it's filled up with  
the TV camera so your view now is probably better than ours  
is.  
CAPCOM Roger, we copy.  
CAPCOM 11, Houston. If you could  
comply, we'd like to see a little smiling faces up there,  
if you could give us an interior view. I'm sure everybody  
would like to see you. Over.  
SC Okay, we'll reconfigure the  
TV for that.  
CAPCOM Roger.  
CAPCOM Apollo 11, Houston. It appears  
to us that we're seeing a view from outside plus a little of  
the inside. It appears you've taken the camera away from  
the left window now. Over.  
SC That's correct. We're moving  
it back and reconfiguring for interior lighting.  
CAPCOM Roger.  
CAPCOM We can still see the earth  
through the left window and it appears that we can see a  
floodlight off to the left, either that or some sun shafting  
through the hatch window.  
SC It's sunlight.  
CAPCOM Rog.  
CAPCOM Now we're coming in. Can't  
quite make out who that ...  
SC That's big Mike Collins, there.  
You got a little bit of - Yeah, hello there sport friends,  
you got a little bit of me plus Neil is in the center couch,  
and Buzz is doing the camera work just now.

CAPCOM Roger. It's a little dark, 11.  
Maybe a bigger f-stop might help.

SC Yeah, that should work.

CAPCOM It's getting a lot better now, 11.  
Mike, you're coming in 5 by. I got a good -

SC I would have put on a coat and  
tie if I'd known about this ahead of time.

CAPCOM Is Buzz holding your cue cards  
for you? Over.

SC Cue cards have a no. We have  
no intention of competing with the professionals. Believe me.  
We are very comfortable up here, though. We do have a  
happy home. There's plenty of room for the three of us and  
I think we're all willing to find our favorite little corner  
to sit in. Og's very comfortable but after a while, you get  
to the point where you sort of get tired of rattling around  
and banging off the ceiling and the floor and the side, so  
you tend to find a little corner somewhere and put your  
knees up, or something like that to wedge yourself in, and  
that's seems more at home.

CAPCOM Roger, looks like Neil is coming  
in 5 by, there, 11. Mike, see you in the background. The  
definition is really outstanding. The colors are good.  
It's a real good picture we're getting here of Commander  
Armstrong. We - Buzz, when you take the camera over towards  
the window where the sun's shafting through it, it tends to  
black it out, though.

SC And Neil's standing on his  
head again. He's trying to make me nervous.

CAPCOM Roger.

SC He's disappearing up into the  
tunnel, of course, hasn't he, but going into the lunar module,  
only backwards.

CAPCOM Roger. We can see portions of  
the LAP now. The Systems test meter Panel, in the lower part of the  
picture. We did have it anyway.

SC Okay, and then directly behind  
his head are our optical instruments, the sextant and the  
telescope that we use to take sightings with.

CAPCOM Roger, copy. And we see the  
DSKY flashing with a 651. In fact, we can read registers 1  
and 2 quite clearly.

SC The aerial high gain angles  
telling us which way the earth is.

CAPCOM Copy. That's a beautiful  
picture. Clarity is ...

SC We offer to give you the time  
of day in our system of mission elapsed time. Elapsed time  
34 hours 16 minutes and umpteen seconds.

SC Houston, CAPCOM Goldstone MNO  
Net 1.  
CAPCOM Go.  
SC The TV people do not access to  
Net 1 in that area. Suggest we use Net 2 for that purpose.  
SC Say go to Net 2?  
CAPCOM Hello Apollo 11, Houston. The  
Goldstone TV guys say they have some horizontal banding  
across the upper part of the picture and across the lower  
part. They would consider the lines just strayed; no  
wave in the storm at all. Over.  
SC Roger, understand. They do seem to  
distort vertical lines though.  
CAPCOM Say again about the vertical lines  
Buzz.  
SC Roger. When there's a vertical  
line, these horizontal bands tend to - put small waves in  
it.  
CAPCOM Roger. I copy. He didn't mention  
that. Stand by, I'll check again.  
CAPCOM Hello 11, Houston. The Goldstone  
TV said that when you did a sharp vertical line on a  
picture, was he - horizontal panning goes across it, does  
appear to bend it slightly. The same as Apollo 10, they  
said. Looks okay to them. Over.  
SC Okay, understand. It's not our  
monitor, it must be the transmitter or the distance.  
CAPCOM Roger. I guess so but we'll have  
them look into it and see if they can suggest anything.  
PAO This is Apollo Control at 31 hours,  
5 minutes and here in Mission Control we're changing shifts  
at this time. Flight Director Gene Krantz is replacing  
Flight Director Clifford Charlesworth and our Capsule  
Communicator on this shift will be Charlie Duke.  
CAPCOM Command interface with Goldstone.  
We'd like you to switch to OMNI Delta. Over.  
SC Roger going to Delta.  
CAPCOM Rog.  
PAO Apollo 11, at this time, is 121 158  
nautical miles from earth traveling at a speed of 4613 feet  
per second. We anticipate that the change of shift briefing  
will begin at about 4:00 P.M. Central Daylight Time.  
CAPCOM Hello Apollo 11, Houston. We'd like  
you to terminate the O2 purge if you have not done so  
already and the TV camera people say that the lines are  
inherent in the camera Buzz, and it's something that we  
expected. Over.  
SC Roger understand about the camera.  
Say again about the O2 purge.

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CAPCOM Roger. We can terminate the 02  
purge at this time. Over.

SC Oh, okay. Fine. Will do.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 15:43 GET 31:11 116/1

CAPCOM Hello, Apollo 11; Houston. Please select  
OMNI BRAVO onboard. Over.

SC Take on the (garble), Charlie.

CAPCOM Roger.

SC How's everything going down there? You  
guys happy with the spacecraft systems?

CAPCOM Roger. Affirmative. Everything's looking  
really good to us. Over.

SC Okay. Same here.

SC Charlie, how far out can you pick up TV  
on the OMNI?

CAPCOM Stand by.

CAPCOM Hello, Apollo 11. Houston. We're just  
about to the limits where we can get any kind of picture at  
all on the OMNI's on the TV. It - The picture, I guess, would  
be just almost zero at this point.

SC Okay. Well, for this TV program  
coming up in a couple of hours, you might give some thought  
to how you want us to stop PTC, if you do, for the best high  
gain angle and also it would be nice if you could stop us at  
such an attitude that we'd have the Earth out of one of our  
windows.

CAPCOM Roger, 11. We're thinking about that.

SC Okay.

CAPCOM Hello, Apollo 11; Houston. We got some  
pipa biases and general drift updates for you if you give us  
to an accept. Over.

SC Okay, Charlie. Stand by one.

CAPCOM Roger, 11. The - Okay, thank you much.  
Our biggest drift on the gyros is 0.03 degrees per hour with  
only X-gyro. On the pipas, the wide pipa's the biggest and  
it's 0.006 feet per second so we just kinda tweak it  
up. The biggest we have is about one sigma on both gyros  
and accelerometers.

SC Sounds good.

CAPCOM The system really looks good to us.

SC And here, Charlie.

CAPCOM 11, Houston. You can go back to block.  
We accept the load in.

SC Okay. Roger.

PAO This is Apollo Control at 31 hours, 22  
minutes. We're scheduled to begin the change of shift briefing  
shortly. During the briefing we will record any conversations  
with the crew and play those back following the briefing. At  
31 hours, 22 minutes, this is Apollo Control.

END OF TAPE

SC Right. You see that clearly  
now, Charlie?  
CAPCOM Roger, Apollo 11. We can see  
it counting up every - every second. We got 34:17:02 now.  
SC Okay, back to the high gain  
angles.  
CAPCOM Roger.  
SC Now we have amputated those.  
CAPCOM 11, Houston. We have beautiful  
rainbow there now as you move the camera around. ...  
That looks like the star chart coming into view now. Over.  
SC Yeah, those are Buzzs two  
star charts that he is using right now as sun shades over  
the right-hand window, window number 5.  
CAPCOM Roger. We see the sun shining  
in through it behind him and plotting out the equatorial -  
correction, ecliptic plane, and the stars that you're using  
for the navigation.  
SC You're right. He doesn't really  
need the charts. He's got them memorized. There's just for  
show.  
CAPCOM We copy.  
SC While we're pointing up in this  
direction, we see out of our side windows, the sun going by  
and of course, out one of our windows right now we've got  
the earth. Now we find my window, course we have the sun,  
cause the sun is illuminating

END OF TAPE

SC In this direction, we see out our side windows, the sun going by and of course out of one of our windows right now we have the earth. Now right behind my window of course we have the sun and the sun is illuminating the star charts that we see. This line represents the ecliptic plane and these line vertical lines represent our reference system that the spacecraft is using at this time. As we approach the moon, the moon will gradually grow larger and larger in size and eventually it will be in, it will be eclipsing the sun as we go behind it as we approach the lunar orbit insertion maneuver.

CAPCOM Roger 11, we've, could you attempt a little bit better focus here, 11, over?

CAPCOM Eleven, Houston, that's a lot better on the star chart now. We can make out the ecliptic plane and the planets and the sun and the moon as they have gone at various placed throughout the ecliptic plane, over.

SC Okay, Charlie. If we can get some of the wires untangled here we'll give you a demonstration of how easy push ups are up here. Come in, Roger.

CAPCOM Just a view of Buzz there.

SC When it gets pretty hard doing it that way, we just roll over and do it the other way.

CAPCOM Rog, we copy, we couldn't figure out whether that was a chin up or a push up.

SC Just take your choice I guess. Well it looks like it's probably almost your dinner time down there on earth. We'll show you our food cabinet here in a second.

CAPCOM Eleven, Roger.

CAPCOM Eleven Houston. We see a box full of goodies there, over.

SC We really have them, Charlie. We've got all kinds of good stuff. We've got coffee up here in the upper left and the breakfast items and bacon in little small bits, beverages like fruit drink and over in the center part we have, oh all kinds of things. Let me pull one out here and see what it is.

CAPCOM Rog.

SC Would you believe you're looking at chicken stew here. All you have to do is 3 ounces of hot water for 5 or 10 minutes. Now we get our hot water out of a little spigot here with the filter on it that filters any gasses that may be in the drinking water out, and we just stick the end of this little tube in the end of the spigot and pull the trigger three times for 3 ounces of hot water and then mush it up and slice the end off it and there you go. Beautiful chicken stew.

CAPCOM Sounds delicious.  
SC The food so far has been very good.  
We couldn't be happier with it.  
SC Could I borrow that flashlight a second?  
CAPCOM The surgeons are saying thank you there for that.  
SC And it is sort of down in a dark corner so we have a flash light here to help us see things and if I can let go of it carefully it'll just hold itself right where it is.  
CAPCOM Ah roger (garbled)  
CAPCOM Apollo 11, Houston, that's a pretty good demonstration. You started off really stable there Mike.  
SC Well no matter how careful you let go you bump it just a tiny little bit and set it in motion and once in motion there she goes. Try that again.  
CAPCOM It looks fairly stable there with flow rotation.  
SC Well so much for the food department. I'm going to close up the store down here.  
CAPCOM Roger, we copy.  
SC Charlie, we checked out the cable legnth's, and we're thinking we might want to see if we can take the TV into the LM with us tomorrow for part of the time, over.  
CAPCOM Roger, good show. We'd like to see it if it'll reach that far, over.  
SC We'll give it a try.  
CAPCOM Rog.  
SC And where we sleep is down underneath this couch.  
CAPCOM Houston, Roger. Slowly sinking into the sack there.  
SC It's really comfortable. Forgot to give Buz his flashlight back.  
CAPCOM Apollo 11, Houston, could you give the folks a view of your patch on your CWG'? Over.  
SC (garbled) Charlie we can't get any closer.  
CAPCOM Alright. Eleven, Houston. We have a patch. Could you cut the, put the focus slightly, over. Eleven, Houston. The scan on the camera makes the, that's a little bit better now. The flashlight seems to flicker due to the scan on the TV. We can't see the eagle. Now it's a little bit better, over. Could you open the ESTOP a little bit more? Over.  
SC It's open all the way. We're going to have to move Buzz around a little bit.

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 18:51, GET 34:19, 126/3

CAPCOM Roger.

CAPCOM Apollo 11, Houston the color is better now. It's coming in. We could attempt a little bit better focus on it. There we go, it focuses alot better now. We see the eagle coming right in on the lunar surface, over. That's very good now.

CAPCOM Apollo 11, Houston. That's very good now. We can see the earth in the background, Apollo 11, and the eagle coming in.

SC It's probably pretty hard to see the olive branches.

CAPCOM Roger, it is.

SC Well that's what he has in his talons, an olive branch.

CAPCOM Copy. Apollo 11, Houston. We're really impressed with the clarity and the detail that we have in the picture. The colors are, it's really an excellent picture now that I'm looking at it on moniter which is about 12 seconds before the networks can get it out due to the conversion that we have here on our TV converter. We're looking at the controls in the main display console. We can see the DSKY up on the pannel, over.

SC That'd be nice if you could take a look at all the circuit breakers. You could be sure the right ones are in and the right ones are out.

CAPCOM Big bubba's watching.

SC And we're glad of it. Boy you guys have sure been doing a good job of watching us. Charlie we appreciate it.

CAPCOM The spacecraft's been beautiful eleven. There's really no complaints at all. Things are really great.

SC Can you see this DSKY on the embassy.

CAPCOM That's affirmative. It appears that we can't quite tell what program when the cut went through. We see you punching in a verb 35 I think it is, over.

SC Yea might as well tell the econs or tell the G&C's they better hold on to their hat and I'll push the inner button.

CAPCOM Rog. We see a real display now. That was a good demonstration of how the crew has the interface with the computer talking to the programs and all that we have in the computer.

SC Well that's right Charlie. Sometimes it tells us things and sometimes we tell it things and mostly it talks to us.

CAPCOM Eleven, Houston. We just lost our pic - I see we're going back outside now, over.

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 34:19, CDT 18:51, 126/4

CAPCOM Eleven Houston. We copy, over.  
SC Roger we copy and as we pan back out to the distance at which we see the earth it's Apollo 11 signing of.

CAPCOM Roger Apollo 11, thank you much for the show. It's a real good half hour. Appreciate it, thank you very much, out.

PAO This is Apollo control. That TV transmission lasted about 35 minutes.

CAPCOM Apollo 11, Houston. Would you key your - -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, CDT 19:08, GET 34:36:00 127/1

CAPCOM Apollo 11, Houston. Would you T arrow reset on the DSKY please? Over.

SC Okay, we should be straightened out now Charlie. Back in P00.

SC Houston, Apollo 11. How dowe stand on this O2 fuel dump purge? You want to go ahead and do that as scheduled in the flight plan?

CAPCOM Standby 11, over.

SC Okay.

CAPCOM 11, Houston. You can commit CO2 fuel cell purge now if you would like. Over.

SC Okay, fine.

SC While Buzz is doing that, I'll change the aluminum hydroxide.

CAPCOM Rog.

CAPCOM Hello Apollo 11, Houston, over.

SC Go ahead, Houston, Apollo 11.

CAPCOM Roger, Buzz, the attitude that we are in right now is a convenient one to start PTC and we'd be satisfied with this attitude so we would like you to disable quads CHARLIE and DELTA and we will wait about 5 or 10 minutes and then we will establish the PTC over.

SC Roger, disable CHARLIE and DELTA and we'll wait for starting PTC.

CAPCOM Rog.

CAPCOM Retro, you got your block data.

END OF TAPE



PAO This is Apollo Control at 35 hours, 13 minutes. Apollo 11 is presently about 93 265 nautical miles from the moon and with respect to the moon is traveling at a speed of about 4019 feet per second. At this time we are receiving the tape play-back which Goldstone, tracking site at Goldstone, California received from the spacecraft in that earlier unscheduled TV transmission. This was a test of the system using the spacecraft on the antennas, the small OMNI directional antennas. Normally transmissions from this distance in space would be - would require the high-gain antenna. This television transmission is being processed and converted to color and we anticipate that we'll have it available for playback at about 9:00 P.M. We are in conversation with the spacecraft at this time. We'll pick up the tape recorded conversation that we have and then stand by to follow any live conversation.

SC Houston. Would you say again what you requested.

CAPCOM Roger 11. We'd like you to go back to attitude HOLD. Over.

SC Roger.

CAPCOM 11, Houston. Looks like we're going to have to reinitialiate - reinitialize this PTC.

SC Right.

SC Okay. Do you have any roll angles and see if I can drop it in Charlie? I haven't stopped it yet.

CAPCOM Stand by. 11, Houston. It's your preference. Right now if you want to. Over.

SC Okay.

CAPCOM Apollo 11, Houston. Over.

SC Houston, Apollo.

CAPCOM Roger 11. The problem on that initial starting up the PTC was we failed to do the VERB 49 which - and load the design to initial attitude so that - that will take you back to the old attitude that we had started up in a number of hours ago that's why we picked up the rates in the other axes. We're going to obate in this attitude for about 20 minutes to damp out the rates again and then we'll proceed with the VERB 49 in LOAD I attitude that we have at this time. Over.

SC Okay. Sounds good Charlie. When you get to the VERB 49, I'd like for you to give me the 3 gimbal angle that you want loaded.

CAPCOM Roger. We'll do. Over.

SC Thank you.

CAPCOM And Apollo 11, Houston. We have

CAPCOM your fly-by pad if you're ready to  
copy. Over.

SC Stand by 1.

SC Houston, Apollo 11. Is that P-30  
pass?

CAPCOM That's affirmative. Over.

SC Okay. Ready to copy.

CAPCOM All right Buzz. It's fly-by, it's  
a purpose. SPS G&N. 62815 plus 097 minus 020 070 54 5944  
minus 00028 plus 00023 plus 00069 029 149 312 apogee is  
N/A plus 00221 00078 001 00034; sextant star 01 2185 227  
boresight star is NA NA NA. Latitude is minus 0265 minus  
16500 11899 36228 1445647. In the comment your set stars  
are DENEK and VEGA 007 144 068; no ullage, it's a dock burn  
using the PTC REFSMMAT. Stand by for your readback. Over.

SC Okay. Would you give me the GEG  
of the burn again, please.

CAPCOM Roger. 1445647. Over.

SC Roger. Fly by SPS G&N 62815 plus  
097 minus 020 070 54 5944 minus 00028 plus 00023 plus  
00069 269 149 312 NA plus 00221 00078 001 00 034 01 21 85  
227 NA minus 0265 minus 16500 11899 36228 1445647 DENEK  
and VEGA 007 144 068, no ullage dots PTC REFSMMAT. Over.

CAPCOM Say again your roll angle Buzz.  
I copy - I read 029. Over.

SC Roger 029.

CAPCOM Roger. Good readback.

SC Houston, Apollo 11. On the 7/10ths  
rate, the rate loaded into the dap is 1 or 2/10ths.

CAPCOM 11 Roger.

CAPCOM Hello Apollo 11, Houston. Over.

SC It's Apollo 11, Over.

CAPCOM Roger Mike. Would you please copy  
down your VERB 16 NOUN 20 after the angles now, then  
execute VERB 49 and load those angles, the NOUN 20 that you  
see on the DSKY into the VERB - into the NOUN 22 slot and  
prone that and that will start our 20 minute rate period.  
Over.

SC Okay Charlie, I did it right now  
in just a matter of inches. Those numbers are plus 04511  
plus 09021 and plus 35984. Over.

CAPCOM Roger.

SC Thank you.

SC Houston, Apollo 11. I've done that  
and of course I got an immediate 50 18. So I guess we're  
set up to proceed from here and I'll start the 20 minute timer.

CAPCOM That's affirmative.

SC Houston. I still question that  
7/10ths rate where 2/10ths went into the damper up here.

APOLLO 11 MISSION COMMENTARY 7-17-69 CDT 19:47 GET 35:13 129/3

SC Could you explain? Over.  
CAPCOM Roger. We're working on it.  
Stand by 1.  
SC Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-17-69, CDT 19:57, GET 35:23:00 130/1

CAPCOM Apollo 11, Houston, over.  
SC Houston, Apollo 11.  
CAPCOM Roger, we got a little laser visual experiment we like to - for you to do for us. If - if you got the Earth through any of your what is it the telescope, would you so advise? Over.

SC Can't understand. Wait a minute, Charlie.  
- at this lower attitude what should our high gain angles be? Maybe that would help us locate you. We don't see you on the lens.

CAPCOM Standby.  
CAPCOM Hello Apollo 11, Houston. The high gain angles are: pitch minus 70, yaw; 90. We think the Earth has apparently pretty close to plus C axis, over.

SC Okay.  
SC Okay, Charlie, I got you on the telescope.

CAPCOM Roger, Apollo 11. We got a laser that we're going - it's a blue-green laser that we are going to flash on and off at a frequency of on for a second and off for a second. It's coming out of McDonald Observatory near El Paso which should be right on the terminator or right inside the terminator. We are going to activate that momentarily. Will you please take a look through the telescope and see if you can see it, over?

SC Telescope or sextant?  
CAPCOM Either one, over.  
SC Okay, I'll try it with the telescope and if I don't see it there then I'll try the sextant.

CAPCOM Roger, we'll give you the word when they have got it turned on, over.

SC Okay.  
CAPCOM 11, Houston, They don't have it turned on yet. We'll give you the word when they got it turned on, over.

SC Okay.  
CAPCOM Hello, Apollo 11, Houston. We noticed the cryo pressure dropped a moment ago. Did you stir up the cryos, over?

SC Roger, we've finished (garble) operations.  
CAPCOM Rog, copy, out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 20:07 GET 35:33 131/1

CAPCOM Hello, Apollo 11; Houston. McDonald's got the laser turned on. Would you take a look? Over.

SC Okay, Charlie.

CAPCOM It's bluish green.

CAPCOM 11, Houston. We got some shaft and trunnion for you that might tweak it up a little bit. Shaft of 141.5. Trunnion of 39.5. Over.

SC Test that one.

CAPCOM Apollo 11, Houston. If you see it, it should be coming up - better be coming up through the clouds. McDonald reports that there's a break in the clouds that they're beaming this thing through. Over.

SC And I thank you.

SC Got her.

CAPCOM Hello, Apollo 11; Houston. You can terminate the exercise on the laser. Our REG's are steady enough now for it to commit the PTC. Over.

SC Okay, Houston. Neither Neil nor Mike can see it. Incidentally, those shafts and trunnions just missed pointing at the world.

CAPCOM Roger. Thank you.

SC As we are looking at it through the scanning telescope, it would be about a - oh, maybe a third of an Earth's radii high in the left.

CAPCOM Roger.

SC But, we did - But, we did identify the El Paso area and it appeared to us to be a break in the clouds there, and we looked in that break and saw nothing.

CAPCOM Roger; thank you much. Out.

SC Houston, Apollo 11. Over.

CAPCOM Roger. Go ahead. Over.

SC Weren't you following that on the DSKY?

CAPCOM Roger. Stand by.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, CDT 20:17, GET 35:43 132/1

SC Were you following that on the DSKY?  
CAPCOM Roger, stand by.  
CAPCOM Eleven, Houston. What's your exact question, over.

SC I've followed the procedure through step 7 down to the point where I've got 27 303 enter and then we go to an operator light.

CAPCOM Roger, stand by.

CAPCOM Apollo 11, Houston, stand by a moment. We'll have a answer for you momentarily, over.

SC Okay appreciate it Charlie. Now the light's gone out without any further DSKY action.

CAPCOM Roger.

SC Correction, stand by that's not right.

CAPCOM Roger.

CAPCOM Apollo 11, Houston.

SC Houston, Apollo 11.

CAPCOM Roger we've finally gotten concurrence on the problem here with 50 guys looking at it. When we were sitting in the 58 team we attempted to load the erasable before you terminated the verb 49. So Mike what we're going to have to do is call off the present CDU's, copy those down and do a verb 49. Load the present, do a proceed then an enter and then we can then set up attitude hold with step 6, over.

SC Okay, I think that's what we did last time.

CAPCOM It appeared to us that we attempted to load the erasable prior to entering on the verb 49 which verb 49 was still running and it clobbered the CDU's, over.

SC Okay.

SC Houston, Apollo 11, and we're moving at the proper rate.

CAPCOM Halalua.

CAPCOM Eleven, Houston. It looks great to us now. Over.

SC It looks fine here Charlie. The (garbled) part is the only part I don't find explained yet.

CAPCOM Roger, Mike. We're working on that one right now. We're coming up with the story soon, over.

SC Thank you.

CAPCOM Eleven, Houston, we're having com from Goldstone to Honeysuckle, over.

SC Okay.

SC Hello Houston, through Honeysuckle ov- -  
CAPCOM Apollo 11, Houston go ahead over.

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 35:43, CDT 20:17, 132/2

SC You sound good to us through Honeysuckle. How do we sound?

CAPCOM Roger, 5 by Mike. We'd like to omni configuration as follows. OMNI ALPHA place in BRAVO, OMNI to OMNI - -

END OF TAPE

SC - and the configuration as follows:  
OMNI ALPHA placed in BRAVO, OMNI to OMNI, high gain track to  
MANUAL, high gain yaw 270, pitch -

PAO This is Apollo Control. At the  
present time we are handing over from the tracking site at  
Goldstone, California, to the site at Honeysuckle which ac-  
counts for the noise in the transmission -

SC - I've got S-band OMNI Z OMNI, track  
to MANUAL and beam Y and pitch, better say that again, yaw  
270, over.

CAPCOM Roger, Buzz. I broke up that pitch  
minus 50 at beam Y, over.

SC Roger, copy.

SC Houston, Apollo 11. Are you ready  
to copy some numbers on status report (garble)

CAPCOM Say again, over.

SC Roger, ready to copy some numbers on the  
status report, Houston.

CAPCOM Rog. Go ahead, over.

SC Okay, radiation CDR 11005, CMP 10006,  
LMP 09007. Medication negative, and I got some (garble).

CAPCOM Go ahead, over.

SC Battery C 37.1, pyro battery A and  
G both 37.1. RCS ALPHA 82, BRAVO 84, COCCO 85, DELTA 87, over.

CAPCOM Roger, we copy. Radiation 11005

10006 09007. No medication. 37.1 37.1 37.1 82 84 85 87, over.

SC That's affirmative. And you want a

LM GM DELTA V at 1.1.

CAPCOM Roger, copy, 11.

CAPCOM Hello, Apollo 11, Houston. Please  
verify that 4 cryo heaters AUTO, the four fans OFF.

SC Okay, we have been holding the O2  
heater in the OFF position. I believe that was your last  
last instructions. All the other heaters are to On and all  
fans are OFF. Over.

CAPCOM Roger, standby.

CAPCOM 11, Houston. We would like all heaters  
AUTO, over.

SC All four on AUTO, all four fans OFF.

CAPCOM Hello, Apollo 11, Houston. As the sun  
sinks slowly in the west, the white team bids you good night.  
If we get a story on the 7 tenths, we can give it to you in  
about 15 minutes or so, if not, we'll give it to you in the  
morning, over.

SC Okay, sounds fine, thank you Charlie  
very much.

SC Have a nice day today, Charlie.

CAPCOM Thank you.

SC Good night all.

PAO This is Apollo Control at 36 hours  
11 minutes. At the present time Apollo 11 is 134 000 nautical  
miles from Earth. The velocity is 4216 feet per second. During



APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 21:00 GET 36:27 134/1

PAO This is Apollo Control at 36 hours, 27 minutes. We have completed the processing of the unscheduled television transmission which the crew sent down from the spacecraft at about 30 hours, 24 minutes ground elapsed time this evening. I would like to repeat that this was an apparent test of the onboard system. The crew turned the television equipment on and left it on for about 52 minutes. Some of the time we will have a picture of the parts of it. We don't have good lock-on, and I will not have a good solid picture. We should also point out that this transmission was made with the OMNI directional antennas, which, of course, don't provide nearly the signal strength that we would get from the high gain antenna, which would be used. We'll play back the tape of that transmission for you at this time.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, this is Houston. Goldstone reports they're receiving a TV picture coming down from you all - a little snowy, but a good TV picture. Over.

SC Roger. We're just testing the equipment up here.

CAPCOM Roger.

SC Ask them if they can read the numbers.

CAPCOM Okay, stand by.

CAPCOM Goldstone, this is Houston Capcom. Over.

GOLDSTONE Houston Capcom, Goldstone M&O. Go ahead.

CAPCOM Roger. Stand by a minute, Goldstone.

CAPCOM 11, this is Houston. What numbers are you referring to? Over.

SC Well, I guess if they can't see any numbers, why, it's kind of a lost cause.

CAPCOM Negative. Stand by. We wanted to know what numbers before we asked them.

SC Okay. I'm showing them a DSKY, and I'd like to know whether they can read what's showing on the DSKY, and also whether they can see PROG, VERB, and NOUN. Over.

CAPCOM Roger. Stand by a second.

CAPCOM Goldstone M&O, this is Houston Capcom. Over.

GOLDSTONE Capcom, Goldstone; go ahead.

CAPCOM Roger. Did you copy the spacecraft request?

GOLDSTONE That's affirmative. I am reading the numbers on our monitor here.

CAPCOM Okay, that's up. Stand by.

CAPCOM Roger. That's both the numbers on the DSKY itself and the little words like program, verb, noun, computer activity, things of that sort.

APOLLO 11 MISSION COMMENTARY 7/17/69 CDT 21:00 GET 36:27 134/2

GOLDSTONE Roger. I can read the numbers clearly. We can't distinguish what the words are, because it is a little snowy.

CAPCOM Roger. Thank you.

GOLDSTONE Okay. I read VERB, NOUN, and PROGRAM.

CAPCOM Roger. Do you see a - over in the left-hand corner there's a big square that says computer activity, COMP activity?

GOLDSTONE Roger. I see a flash occasionally in that area.

CAPCOM Roger. That's the one.

GOLDSTONE Okay, it looks like he's moved the camera at this time.

CAPCOM Roger.

CAPCOM 11, this is Houston. Goldstone M&O reports that they can read the numbers on the DSKY. They can also read VERB, NOUN, PROGRAM, and see the COMP activity light flashing. Over.

SC Very good. Thank you.

CAPCOM And they also report you appear to have had the camera over to another location now.

SC Yes, we're going to work on something else.

CAPCOM Roger.

SC V.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 36:37 CDT 21:10 135/1

PAO This is Apollo Control. The view that we have at the present time appears to be out the window of the command module looking at the lunar module docking target.

PAO And we seem to have a fairly good view here of the interior of the command module. This would look to be the panel, display panel with some of the fuel quantity dials on the right side of the cockpit.

PAO At the time these television pictures were transmitted from the spacecraft, Apollo 11 was about 121 thousand nautical miles from earth. Where we do have signal lock on we got amazingly good quality on those little omni antennas. As we had mentioned before, normally the high gain antenna would be used for television transmission of this sort.

PAO And we could almost make out a face in that one, and somebody's hand down at the instrument pannel.

PAO That last view just before we lost picture lock up appeared to be the right center portion of the main display console, main display pannel in the command module.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 36:47, CDT 21:20 136/1

PAO For a brief moment there we had a picture of a somewhat placid Neil Armstrong closing his eyes momentarily. Another crewman to his left, I'm not sure at this point, that I can make out who it was, it did appear it might have been Mike Collins.

SC Houston, Apollo 11.

CAPCOM Go ahead 11.

SC Charlie, is that you.

CAPCOM That's me, how are you today?

SC Just fine, how's the old white team today?

CAPCOM The old white team's bright eyed and bushy tailed. We're ever alert down here.

SC Ever alert, hey you got any medics down there watching high grade. I'm trying to do some running in place down here and I'm wondering just out of curiosity whether it brings my heart rate up.

CAPCOM Well they will spring into action here momentarily, stand by.

PAO That was Mike Collins commenting that he was doing some running in place exercises, and we may get a brief view of that a little later on in this transmission if this picture stabilizes and holds still for us.

CAPCOM Hello 11, we see your heart beat.

SC (garbled) We're all running in place up here. You wouldn't believe it.

CAPCOM I'd like to see that sight. Why don't you give us a Tv picture of that one.

SC I think Buz is trying. He got it.

CAPCOM Okay it's coming in at Goldstone Buz. We don't have it here in the center.

SC I imagine that didn't help out the PTC very much.

SC I don't know whether it's the vibration or what it is but it makes the, pitch and yaw rate needles on the FDAI jump up and down a little bit when we jump up and down.

CAPCOM Rog, Goldstoners say they see you running there Mike.

SC Okay.

SC Ask him what he's running from.

CAPCOM Eleven, Houston. Mike we see about a 96 heart beat now.

SC Okay, thank you.

SC Well that's all that's reasonable without getting hot and sweaty.

CAPCOM Alright, Rog, we copy.

APOLLO 11 MISSION COMMENTARY, 7/17/69, GET 36:47, CDT 21:20, 136/2

END OF TAPE

SC Goldstone should be getting about  
the best picture of the earth, we can get, right now Charlie.  
CAPCOM Roger Mike. Thank you much.  
SC We got a little distortion horizontal  
direction from our damping on our monitor. I wonder if  
they're getting the same thing.  
CAPCOM Stand by Buzz. I let you know.  
SC I guess it'd be more described  
as a waviness.  
CAPCOM Goldstone, M & O. Houston, CAPCOM.  
GOLDSTONE M & O Goldstone, M & O.  
CAPCOM Okay. The crews complaining of  
some horizontal banding on their monitor. Do you all see  
that on your picture?  
GOLDSTONE Stand by.  
GOLDSTONE No we don't see it right now. Don't  
have anything in focus Charlie.  
CAPCOM Roger. He's checking on it. I'll  
see if they had it earlier. Stand by.  
SC I guess when we were showing the  
DSKY or when we were showing the earth, might be the better  
time.  
CAPCOM Okay.  
GOLDSTONE Houston, CAPCOM Goldstone.  
CAPCOM Go ahead.  
GOLDSTONE Okay. Our TV people confirmed they  
see this horizontal band.  
CAPCOM Okay.  
CAPCOM 11, Houston. The Goldstone TV  
people also see the banding when same time you all do. Over.  
SC Okay. Would they call it a  
horizontal waviness from our banding, maybe?  
CAPCOM I'm not talking to him directly.  
Stand by Buzz. Let me see how they describe it.  
CAPCOM Goldstone M & O, Houston CAPCOM.  
Could you put the TV down a little please?  
GOLDSTONE CAPCOM, Goldstone. Roger.  
GOLDSTONE Houston CAPCOM, Goldstone M & O  
Net 1.  
CAPCOM Go.  
GOLDSTONE The TV people do not have access to that  
one in that area. Suggest we use NET 2 for that purpose.  
CAPCOM Okay. Go into NET 2.  
CAPCOM Hello Apollo 11, Houston. The  
Goldstone TV guy said that they had some horizontal banding  
across the upper part of the picture and across the lower  
part. They would consider the lines just strayed, no  
waviness at all. Over.  
SC Roger understand. They do think

APOLLO 11 MISSION COMMENTARY 7-17-69 CDT 21:30 GET 36:57 137/2

SC                                   they do distort vertical lines,  
though?  
CAPCOM                               Say again about the vertical lines,  
Buzz.  
SC                                   Roger. When there's a vertical  
line, these horizontal bands tends to put small waves in them.  
CAPCOM                               Roger. I copy. He didn't mention  
that. Stand by, I'll check again.  
CAPCOM                               Hello 11, Houston. The Goldstone  
TV said that when you did a sharp vertical line on the  
picture, where the horizontal banding goes across it, does  
appear to bend it slightly. The same as Apollo 10, they  
said. Looks okay to them. Over.  
SC                                   Okay. Understand it's not our  
monitor, must be the transmitter or something.  
CAPCOM                               Roger. I guess so Buzz. We'll  
have them look into it and see if they can suggest anything.  
CAPCOM                               Hello Apollo 11, Houston. We've  
lost our command interface with Goldstone. We'd like you  
to switch to OMNI DELTA. Over.  
SC                                   Roger. (garble) DELTA.  
CAPCOM                               Roger.  
CAPCOM                               Hello Apollo 11, Houston. We'd  
like you to terminate the 02 purge if you've not done so  
already and the TV camera people says the lines are inherent  
in the camera Buzz, and it's something that we expected.  
Over.  
SC                                   Roger. Understand about the camera.  
Say again about the 02 purge.  
CAPCOM                               Roger. We can terminate the 02 - -

END OF TAPE

CAPCOM Over.  
SC Roger, I understand about the camera. Say again about the torquing purge.  
CAPCOM Roger. We can terminate the 02 purge at this time. Over.  
SC Oh, okay. Fine, we'll do.  
CAPCOM Hello Apollo 11, Houston. Please select OMNI Bravo onboard. Over.  
SC Check on to Bravo. Shall we?  
CAPCOM Rog.  
SC How's everything going down there? You guys happy with the spacecraft system?  
CAPCOM Roger. Affirmative. Everything is looking really good to us. Over.  
SC Charlie, how far out can you pick up TV off the OMNI?  
CAPCOM Stand by.  
CAPCOM Apollo 11, Houston. We're just about at the limit where we can get any kind of picture at all on the OMNI on the TV. It - The picture is, I guess, it'd be just almost zero at this point.  
SC Okay, well for this TV program coming up in a couple of hours, you might give some thought to how you want us to stop PTC. If you do, for the best high gain angle, and also it'd be nice if you could stop us at such an attitude that we'd have the earth out of one of our windows.  
CAPCOM Roger, 11. We're thinking about that.  
PAO This is Apollo Control. That concludes the replay of the test transmission from Apollo 11. That transmission occurred about 2 hours prior to the regularly scheduled TV transmission this evening. The crew, apparently, testing out the onboard system, and we received about 52 minutes of intermittent television using the spacecraft OMNI directional antennas. And as you could see, as particularly near the end, this is just - appears to be just about the limit television reception from the OMNI antennas. At the time of the transmission, Apollo 11 was about 121,000 nautical miles from earth. During the replay of that television transmission, we accumulated a very short amount of tape, one or two brief comments from the crew who are in their sleep period at this time. We'll play back that tape conversation for you now.

END OF TAPE

PAO - replay of the test transmission from Apollo 11. That transmission occurred about 2 hours prior to the regularly scheduled TV transmission this evening. The crew apparently testing out the onboard system. We received about 52 minutes of intermittent television using the spacecraft OMNI directional antennas. As you can see it is particularly near the end. This is just - appears to be just about the limit of television reception from the OMNI antennas. At the time of the transmission, Apollo 11 was about 121,000 nautical miles from Earth. During the replay of that television transmission, we accumulated a very short amount of tape. One or two brief comments from the crew who are in their sleep period at this time. We will play back the tape conversation for you now.

CAPCOM Hello Apollo 11, Houston. One request the optics switched to 0 and we have a lot of theories of why it maneuvered at 7/10ths a moment ago Mike, but no real definite answer. We'll be back with you later, over.

SC Okay, no rush, Charlie.

SC Houston, Apollo 11.

CAPCOM Roger, Mike I think we can explain that 7/10ths rate. When we - the first half through to show through the VERB 49 so we had a large error between our actual PU and desired PU in roll and with that situation the DAP or the vehicle will roll or maneuver rather at a rate - that is loaded in which was 3/10ths plus 4/10ths rate and it will limit it 4/10ths above the desired rate. So, that is, if we have a large enough angle between the desired and the actual which we did, so therefore the rate was 4/10ths plus 3/10ths which would give you the 7/10ths, over.

SC Okay, thank you.

CAPCOM Roger.

PAO At this time Apollo 11 is 137,219 nautical miles from Earth. The spacecraft is traveling at a speed of 4132 feet per second. Here at Mission Control things have settled down into a rather quiet nighttime routine. We said good night to the crew about 36 hours - 36 hours 9 minutes to be exact, a little over a hour ago. We did hear from them once or twice since then and we anticipate that this time are probably getting settled down to begin their 10 hours sleep period. At 37 hours 21 minutes, this is Apollo Control.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/18/69 GET 40:58:00 CDT 1:30 142/1

PAO This is Apollo control 40 hours 58 minutes ground elapsed time. Apollo 11 presently 146,300 nautical miles up from earth. Velocity 3,917 feet per second. Six hours 1 minute remaining in the sleep period - the ten hour sleep period schedule in the flight plan. Rather quiet here during the night watch or the black team which tonight is being headed up by flight director Jerry Griffin who is spelling the usual black team flight director, Gene Lunney. One clock here in mission control shows landing time 61 hours 48 minutes from now. This is similar to the entry clock which the - is used in the same position in the control room toward the end of a mission, will be refined continuously as we get down to the gnats hair, the exact second of landing. At 40 hours 59 minutes ground elapsed time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 GET 42:28:00 CDT 2:58 143/1

(Dead air)

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 4:01 GET 43:29 144/1

PAO This is Apollo Control. 43 hours, 29 minutes ground elapsed time. Apollo 11 presently on the spot directly above or directly out from the Malay Peninsula. Some 3 hours 30 minutes remaining in the scheduled 10 hour sleep period for the crew. And if the space digital display were up here at the time coming out of the computer we would know what the distance and velocity were. So, at 43 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 44 hours, 28 minutes ground elapse time. Apollo 11 crew has another 2 hours, 31 minutes remaining in their 10 hour sleep period. The spacecraft is now some 72,010 nautical miles out from the moon. Velocity continuing to decelerate as we get nearer the change over point in influence between the Earth and the moon. Velocity now showing 3,811 feet per second. The spacecraft now calculated to weigh 96,068 pounds. At 44 hours, 29 minutes ground elapse time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 6:00 GET 44:28 146/1

PAO This is Apollo Control, 45 hours 28 minutes Ground Elapsed Time. A little more than an hour remaining in the Apollo 11 crew sleep period. Present velocity, 3799 feet per second. Distance from moon, 69 810 nautical miles. Apollo 11 will continue decelerating as it gets to the point where the moon's sphere of influence overcomes the Earth's sphere of influence. This point will take place - This event will take place at 61 hours 39 minutes and 57 seconds Ground Elapsed Time, according to the Flight Dynamics Officer. At this point, the spacecraft-to-moon distance will be 33 822 nautical miles, spacecraft-to-Earth distance, 186 437 nautical miles. The velocity will have slowed to a relative crawl at this point. The Earth referenced 2990 feet per second, moon referenced 3772 feet per second. Clock counting down to lunar touchdown, which as mentioned before will likely be changed as the spacecraft goes into lunar orbit and the data is refined, some of the times change a few seconds one way or the other. At any rate, the landing clock now showing 57 hours 17 minutes until lunar landing. At 45 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 GET 46:28:00 CDT 7:00 147/1

PAO This is Apollo control 46 hours 28 minutes ground elapsed time. A little more than a half hour remaining in the crew sleep period. Members of the green team of flight controllers headed up by prime flight director Cliff Charlesworth are coming into the control room at this time, and at each console, a handover is taking place from the black watch. At the time - at the present time, the Apollo 11 spacecraft is 67,518 nautical miles out from the moon traveling at a velocity of 3787 feet per second. Apollo 11 presently is being tracked by the Madrid S-band station, and at 46 hours 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69, CDT 7:30, GET 46:58, 148/1

PAO This is Apollo Control at 46 hours, 58 minutes into the mission. The green team led by flight director Cliff Charlesworth has just relieved Glen Lunney's black team. The flight surgeon, Dr. Willard Hawkins indicates the crew appears to be still asleep. We're nearing the end of the scheduled rest period. Cliff Charlesworth indicates. We will put in a call to the crew within a few minutes. Apollo 11 is 158 681 nautical miles from Earth. Velocity 3578 feet per second. Spacecraft weight is 96 068 pounds.

PAO This is Apollo Control at 47 hours, 3 minutes. Cliff Charlesworth has decided to let the crew sleep a little longer. He's just had a conversation with the flight surgeon. Dr. Hawkins reports all indications are that the crew is sleeping soundly. The flight plan does not warrant awaking them just to get them up. There's nothing in the flight plan that requires their attention at the present time, so the flight director has made a decision to not put in a call to the crew and wake them. Flight surgeon says that a look at the data throughout the night indicates that the crew slept rather well all night.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 8:12 GET 47:41 149/1

PAO This is Apollo Control at 47 hours 41 minutes into the mission. From all indications the crew is still asleep. We're 41 minutes past the end of the scheduled 10 hour rest period now. Flight Director Cliff Charlesworth has decided to let the crew remain asleep and not awaken them from the ground. There is no need to awaken them. Nothing scheduled in the flight plan that requires their attention at this time. Apollo 11 is 160 137 nautical miles from Earth, velocity 3544 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 8:32, GET 48:00 150/1

PAO This is Apollo Control at 48 hours into the Apollo 11 mission. The spacecraft is 160 760 nautical miles from earth. The distance from the moon is 64 115 nautical miles. The earth referenced velocity is 3529 feet per second. The rest period has now lasted an hour longer than the 10-hour period scheduled. It is extended to 11 hours now. Flight Surgeon says there are indications that the commander, Neil Armstrong, may be awakening. There is some stirring around, however, we have not yet put in a call to the crew. The midcourse correction 3, which was scheduled for this afternoon at an elapsed time of 53 hours, 54 minutes, has been cancelled. The velocity value for that midcourse is only eight-tenths of a foot per second, so we will not do midcourse correction No. 3. We'll continue to stand by for either a call from the ground or a call from the spacecraft.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 8:41, GET 48:09, 151/1

PAO This is Apollo Control at 48 hours,  
9 minutes. We just put in a call to the crew. Here's that  
conversation.

CAPCOM Apollo 11, Apollo 11, this is Houston.  
Over.

SC Good morning, Houston. Apollo 11.  
CAPCOM Good morning, Apollo 11.  
SC - How's everything look up here from  
the ground?  
CAPCOM Apollo 11, this is Houston. Roger.  
Say again please.  
SC Roger. How do all our systems look?  
CAPCOM Roger, they're looking great and as  
far as we can tell -  
CAPCOM As far as we can tell, everything is  
good from down here. Over.  
SC Looks like the attitude held up real  
well during PTC.  
CAPCOM Yes, it did. We were showing a few  
remaining rolls in a circle of 10 degrees radius throughout  
the night. Seems to be working beautifully.  
SC How's the old green team this morning?  
Did you have a quiet night?  
CAPCOM Yes, it was a very quiet night. Down  
here the old black team is complaining they didn't get a  
chance to make any transmissions. Ron -  
CAPCOM Ron Evans is getting -  
SC Well, we'll be seeing them tomorrow,  
I guess.  
CAPCOM Yes, Ron's getting to be known as the  
silent Capcom.  
SC That's the best kind, Bruce.  
CAPCOM Okay.  
CAPCOM -got a couple of small items in the  
way of a flight plan update and your morning consumables.  
update. Over.  
SC Apollo 11.  
CAPCOM Roger, 11. We'd like to perform a  
waste water dump at your convenience sometime in the near  
future here. No particular time scheduled. Down air at the  
time for midcourse correction 3, which is about 53-55, we're  
deleting midcourse correction number 3 and all the items  
associated with it. For your information, the calculated  
value of the burn for midcourse number 3 was 8/10 of a foot  
per second, that is 0.8 feet per second. Canceling this, if  
we decide to burn midcourse correction 4, this would then  
give you a burn for midcourse correction 4 of 2.0 feet per  
second. At 53 hours we have an IMU on P-52. We're requesting  
that you do this in PTC, and we plan to continue PTC throughout

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 8:41, GET 48:09, 151/2

CAPCOM the day. Over.  
SC - we'll get to the -  
CAPCOM Say again, please. You're cutting  
out.  
SC Roger.  
CAPCOM 11, this is Houston. Stand by a  
minute, please. We're having difficulty receiving you.  
CAPCOM Apollo 11, this is Houston. Radio  
check. Over.  
SC Roger, Houston. Read you loud and  
clear. How me? Over.  
CAPCOM Roger, reading you the same. We did  
a minor reconfiguration down here. Stand by.  
PAO This is Apollo Control. That first  
conversation was with Buzz Aldrin and Mike Collins joined  
in. We've not yet heard from Neil Armstrong.  
CAPCOM Okay, 11, this is Houston. We switched  
your OMNI antenna as you rolled through the first appropriate  
position. Did you copy the flight plan update item?  
CAPCOM Apollo 11, this is Houston. Over.  
SC Apollo 11, go ahead.  
CAPCOM Roger, 11. Did you copy the flight  
plan update items? Over.  
SC Roger. How do you read me now, Bruce?  
CAPCOM Loud and clear now.  
SC Okay. The battery charge is in the  
process now and waste water dump is in work. MCC has been  
canceled. It would have been .8 feet per second. MCC 4  
now looks like about 2.4 feet per second. At around 53 hours  
we'll do a P-52 and PTC. Over.  
CAPCOM Roger, 11. The magnetudes of the  
midcourse corrections were just for your information, but  
midcourse 4 was down around 2.0 feet per second. Again,  
for your information, on SDS chamber pressure, it looks like  
you're onboard readout of 87 PSI corresponds to 92 PSI by  
our telemetry, and your value of 89 onboard corresponds to  
94. Over.  
CAPCOM Apollo 11, Houston. Radio check on  
new power amplifier and our transmitter. Over.  
SC Roger. Read you loud and clear. How  
me? Over.  
CAPCOM Roger. Loud and clear. Did you copy  
my notes on SDS chamber pressure?  
SC Negative.  
CAPCOM Okay, just for your information again,  
it appears that your readout of 87 PSI corresponds to our  
corrected -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 8:51, GET 48:19, 152/1

CAPCOM For your information, again, it appears that your readout of 87 psi corresponds to our corrected TM readout of 92 - that's 92 psi, and 89 onboard is really 94 psi, over.

SC Roger, I got that you were reading about 5 psi low.

CAPCOM Roger, and are you ready for the consumable update?

SC Ready to copy.

CAPCOM Okay, consumables update for GET of 46 plus 00, minus 5.5 percent, minus 6.5 percent, minus 2.5 percent, minus 7.5 percent, minus 5.0 percent, minus 2 pounds hydrogen, plus 1 pound oxygen, and that's minus 5.5 percent on the RCS total corresponds to minus 66 pounds, over.

SC Okay, I copy those, and I'll give you our percentages now. Alpha 82, Bravo 84, Coco 85, Delta 87, over.

CAPCOM This is Houston, we copy your percentages and do you have a crew status report on sleep for us?

SC Roger, and in descending order 8, 9, and 8, over.

CAPCOM Houston, roger, out.

PAO That would be Armstrong 8, Collins 9, Aldrin 8.

SC Houston, we're getting cyro pressure light warning now in the middle of - stirring up the pumps.

CAPCOM Roger, we copy.

PAO This is Apollo Control. The flight surgeon reports that is not a record for sleep. The Apollo 10 crew during one rest period logged 10 hours of sleep.

END OF TAPE

SC Houston, Apollo 11. We've got the continent of Africa raising - facing toward us right now, and of course, everything's getting smaller and smaller as time goes on. The Mediterranean is completely clear. The sun looks like it's about to set around Madagascar. The equatorial belt of Africa stands out quite clearly. We're seeing the dark green or a muddy colored green compared to the sandier colors in the southern tip of Africa and, of course, the Sahara shoreline coast of Africa. There's a rather remarkable cloud that appears in the vicinity of the border between Afganistan and Pakistan. It's just about to go into the sunset now. It is casting a very large shadow (garble). The end of the cloud near the tropical convection clouds all along the equator clearly separates the clockwise and the counter-clockwise cloud formation for us.

CAPCOM Roger, 11. We copy your word description on that - I understand you can see that shadow being cast by that cloud between Afganistan and Pakistan. Any estimate on how long that shadow would be? Over.

SC It looks like it's a shadow. (garble) coming around to back that way - -

CAPCOM We're getting a lot of background noise now, also. Will you stand by a minute or so until we roll a little further in PTC. I think things will get better.

SC Okay, coming around to the number 1 window. We'll get you now.

CAPCOM Roger, we're hearing you.

PAO That's Buzz Aldrin with the description.

CAPCOM 11, this is Houston. The noise on the com seems to have quieted down now. I guess that we've rotated a new antenna into view and probably also the earth out of view in your window. Over.

SC Okay, it looks as though the lines of the shadow of that cloud is about the same as the width of the Persian Gulf.

CAPCOM Okay, we copy the width of the Persian Gulf, and yes that - all I can give you first hand is a single isolated data point, and that is that it was clear here in Houston this morning. That's a pretty localized observation. As a result of your waste water dump, it looks like the PTC mode has been disturbed somewhat. We're showing you about 20 degrees out in pitch right now on about 6 degrees in yaw which is significantly greater - about twice as much - a little more than twice as much as the deviation you had prior to the waste water dump. We're watching it down here, though, and we'll let you know if we think any corrective action is required. Over.

SC Okay, may be ought to next time

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 48:29, CDT 9:01 153/2

SC split that in half. We could  
put half on one side and half on the other or something like  
that.

CAPCOM Yes, we could do that. We were  
actually pretty interested in seeing what the effects on PTC  
would be in a waste water dump. We don't recall ever having  
performed a waste water dump during PTC on previous missions.  
Over.

SC Well, now we know.

CAPCOM Roger.

END OF TAPE

SC Houston, Apollo 11, I am looking at the clouds now on Pakistan through the sextant and it appear to be one single cell in the later stages of development. There is a smaller, more isolated one -

CAPCOM Apollo 11, this is Houston. We lost you down in the noise on the COMM link here about the time you were describing the single-cell cloud formation over Afghanistan-Pakistan area through the sextant. Over.

SC Roger. It came through a lot clearer through the sextant than with the monocular and you could definitely tell it was a one-single cell in the later stages of development. It must have been up to over 50 000 feet though. The eastern Mediterranean is phenominally clear. You can see all the lakes, the Dead Sea, stood out quite well. Over.

CAPCOM Roger. What appears to be the limit of resolution through that sextant from your current position? Over.

SC Well, I can't see it now. It's out from the field of view.

CAPCOM Roger.

SC And I don't know how you'd really describe the limit of resolution. I will think about that a little.

CAPCOM I guess the smallest object that you could pick out looking through it would give us a pretty good idea.

SC Well, you can see the Nile River going almost up to its source. The lake is obscured by clouds, but you can tract it all the way up.

CAPCOM Roger.

SC I guess that is down though, isn't it?

CAPCOM Apollo 11, Houston.

SC Go ahead, Houston.

CAPCOM Roger. We have been working under the assumption that we would take about an hour for the interference from a waste water dump to dissipate to the point where you can reasonably take star sightings for platform alignment navigation or something of this sort. If you have a spare minute or two, could you comment on the observation conditions now. Over?

APOLLO 11 MISSION COMMENTARY, 7/28/69, CDT 9:11, GET 48:29 154/2

SC Yes. Stand by a minute, Bruce.

CAPCOM Okay.

SC My guess would be that a telescope is rather useless, but you can differentiate in the sextant between water droplets and stars by the difference in their motion.

CAPCOM Okay, Mike. I guess that we've still got - what you are saying is that we've still got a lot of water droplets visible, but you can pick them out and distinguish them in the sextant then.

SC Right. I think so, but Buzz is looking through it now. Just a second.

CAPCOM Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 9:21 GET 48:49 155/1

SC Houston, Apollo 11. It looks like at this time the sextant would be quite usable for any alignment. There's actually very few verticals that need to be aligned.

CAPCOM Roger; Buzz. How about the telescope? Is it useful now?

SC Well, it's not quite as useful. It doesn't seem to be. Depending on the position of the sun it's got that band that seems to go across the center. I don't think it's because of the waste water particles that it would lack it's effectiveness. Over.

CAPCOM Roger. What - is this band something that's deposited on the outside of the optics? Over.

SC Now, it's a reflection from the sun.

CAPCOM Roger.

SC The sun bounces off the LM structure. With the LM attached the telescope is just about useless. Those star charts that Ed has provided, I think would be most useful if we had to use the - if for some reason we had to burn through the telescope we could those as a guide for what we're looking at and say, well, that bright blob over there has got to be that star because that's the position we're in, but so far we've not been able to pick out any decent star patterns while docked with the LM using the telescope.

CAPCOM This is Houston. We copy.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT: 9:31, GET: 48:59, 156/1

PAO This is Apollo Control at 49 hours  
7 minutes into the mission. Apollo 11 is 163 040 miles from  
Earth, velocity 3,476 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 9:52, GET 49:20, 157/1

DEAD AIR

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 10:12, GET 49:40, 158/1

SC Houston, Apollo 11, Over.  
CAPCOM Go ahead, Apollo 11.  
CAPCOM Apollo 11, this is Houston. Go ahead.  
SC How do you read? Over.  
CAPCOM Roger, we're reading you loud and clear.  
SC Roger. You're coming back a little  
scratchy. It looks like our 02 flow transducer's gotten a  
good bit worse. I just looked at it at the last water  
accumulator cycling, and it just barely registered - barely  
crept up above .0. Over.  
CAPCOM Roger.  
CAPCOM 11, this is Houston. At the time of  
your cyclic accumulator stroking, we were on low bit rate  
data, and consequently not receiving the 02 flow parameter.  
We expect that what you're seeing is probably nominal, that  
is it's probably what we would expect from a transducer  
that's malfunctioning in effect and it's probably going to  
keep on getting worse like that. Nothing to worry about.  
We'll monitor things on the ground here. Over.  
SC Okay, it does look it's gradually  
degrading to about zilch.  
CAPCOM Roger, we copy.  
PAO This is Apollo Control at 49 hours,  
52 minutes. Apollo 11's distance from Earth is 164 558 nau-  
tical miles. It's velocity is 3441 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 10:32 GET 50:00 159/1

PAO This is Apollo Control at 50 hours 16 min-  
utes. Apollo 11 is now 165 346 nautical miles from Earth,  
traveling at a velocity of 3423 feet per second. Flight  
controllers report all systems well within the normal and  
operating very satisfactorily.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 50:21, CDT 10:53 160/1

PAO                                    This is Apollo Control at 50 hours, 40 minutes. Apollo 11 is 166,135 miles from earth. The Capcom is going to take a radio check here, I think, with the crew.

CAPCOM                                Apollo 11 CDR, this is Houston.  
Radio check. Over.

SC                                     Roger, Houston. CDR loud and clear.

CAPCOM                                Roger. We're reading you the same. Out.

SC                                     And would you check with FAO and see where that errata sheet is? We haven't been able to locate that.

CAPCOM                                Roger. I understand it's supposed to be the back page in Buzz's operation and check list.

SC                                     Okay.

PAO                                    FAO is the Flight Activities Office.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 11:13, GET 50:41, 161/1

PAO                                    Apollo 11's 'velocity' is 3404 feet per second. Spacecraft's still in the passive thermal control mode rotating at .3 of a degree per second or 3 revolutions per hour. Sporadic bursts of static that you hear on the air-ground is caused by the rotation of the spacecraft - changing the orientation of the antennas as the spacecraft slowly rotates to maintain thermal balance.

PAO                                    The back-up lunar module pilot, Fred Haise is at the Capcom console with Bruce McCandless.

PAO                                    That radio check was with the Apollo 11 commander, Neil Armstrong.

PAO                                    This is Apollo Control at 50 hours, 53 minutes into the mission. An important news release will be available in the Apollo News Center at 11:45 Central Daylight Time this morning. At noon, Colonel Frank Borman will be in the building 1 auditorium at MSC for a briefing concerning the news release. Repeating, an important news release will be available at 11:45 a.m. central daylight time in the Apollo news center at MSC.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 50:54, CDT 11:26 162/1

PAO This is Apollo Control at 51 hours,  
7 minutes. Apollo 7 - Apollo 11's distance is 167,007 nautical  
miles from earth. Velocity 3,386 feet per second.

CAPCOM Apollo 11, this is Houston. Did  
you find it? Over.

SC Roger, we found it.

CAPCOM Roger. And I see you improved if  
you can give us accept we'll uplink a new state vector to  
you and update the CMP clock. Over.

SC Okay, you've got it.

CAPCOM Roger.

CAPCOM 11, this is Houston. We're  
through with the uplink. You can go back up block.

SC Roger. Back to block.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 11:46, GET 51:14, 163/1

CAPCOM Apollo 11, this is Houston. We would  
like to terminate the charge on battery B at GET of 5130.  
Over.

CAPCOM Apollo 11, this is Houston. We would  
like to terminate charging battery BRAVO at 5130 GET. Over.

SC Roger, terminate charging battery  
BRAVO 5130.

CAPCOM Roger, out.

PAO This is Apollo Control at 51 hours  
55 minutes into the mission. Apollo 11 is 167 594 nautical  
miles from Earth, moving toward the Moon at a velocity of  
3373 feet per second. All systems are normal. We will be  
utilizing this release line for the Col. Frank Borman  
briefing. During that briefing we will tape any air-ground  
transmissions and play them back after the briefing. This  
is Mission Control Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 51:53, CDT 12:30 164/1

PAO This is Apollo Control at 51 hours, 58 minutes into the mission. Apollo 11 is 168,658 nautical miles from earth traveling at a velocity of 3,349 feet per second. We have 30 seconds of air-ground conversation taped during the news briefing. We'll play that for you now.

CAPCOM 11, this is Houston. We show you terminating battery B charge. Over.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston. Apollo 11.

CAPCOM Roger, 11. We show you terminating battery B charge at about 51 hours, 30 minutes. Over.

SC Okay.

CAPCOM Roger, out.

SC I'm with you.

SC Houston, Apollo 11. (garble)

dead band. Roger.

CAPCOM 11, this is Houston. Say again both what on. Over.

CAPCOM Apollo 11, this is Houston. Affirmative, we request hydrogen and an oxygen fuel cell purge. Over.

SC Okay. Any slip in the switch mode?

CAPCOM Negative. (garble).

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 12:47 GET 52:15 165/1

PAO Apollo 11 is 170 010 nautical miles from Earth, velocity 3319 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 13:17, GET 52:45 166/1

SC Houston, Apollo 11.  
CAPCOM Apollo 11, this is Houston. Go ahead.  
SC Roger. You copy my NOUN 93?  
CAPCOM That's affirmative. We've got it.  
SC Okay. I am going to go ahead and thrust and triangle difference is .01, but it's very difficult at three-tenths rate. I'm required to use medium speed and involed and difficult to hold the star standard long enough to get a decent mark on it.  
CAPCOM Roger. We copy and it looks okay to us.  
SC Right.  
PAO This is Apollo Control at 3 hours, 53 minutes into the mission. Apollo 11 is 170 746 nautical miles from earth, velocity is 3303 feet per second. The crew is now in the process of realigning the spacecraft's enertial platform.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 13:37 GET 53:05 167/1

PAO This is Apollo Control at 53 hours 20 minutes. Apollo 11's distance from Earth is 171 293 nautical miles, traveling at a velocity of 3291 feet per second. The spacecraft's weight is 6068 pounds.  
PAO This is Apollo Control. We have a correction on the orbital parameters of Luna 15 as given in the news briefing recently. The parameters given in that briefing of 72 by 156 nautical miles were based on a computation from an orbital period of 2 hours and 30 minutes instead of the correct 2 hours and 30 seconds. The orbit has been recomputed based on the proper numbers and the parameters for Luna 15, based on a period of 2 hours 30 seconds are 30 by 110 nautical miles, a perilune of 30, an apolune of 110 nautical miles.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 13:57, GET 53:25 168/1

CAPCOM Apollo 11, Houston. Over.

SC Go ahead, Houston.

CAPCOM Roger. I've got the morning news here  
if you are interested. Over.

SC Yes, we sure are. We are ready to  
copy and comment. Isn't it 2:30 there?

CAPCOM Roger. Okay. Here we go. The interest  
in the Flight of Apollo 11 continues at a high level but a  
competing interest in the Houston area is the easing of  
watering rules. Mayor Louie Welch promises a lifting of  
lawn watering restrictions if the rains continue. Friday  
is partly cloudy and there is a 30 percent chance of  
thundershowers in the afternoon. In Washington, D. C. the  
Senate Finance Committee approved extension of the income  
tax surtax but a Senate vote on the bill -

SC You cut out, Houston, you cut out.

CAPCOM Roger, where do you hold me cutting  
out? Over.

SC Houston, Apollo 11.

CAPCOM Apollo 11, Houston. Over.

CAPCOM Apollo 11, this is Houston. How do  
you read now? Over.

SC Loud and clear, Houston. Go ahead.

CAPCOM All right.

SC - rains in Houston.

CAPCOM Roger. And Washington. The Senate  
Finance Committee has approved extension of the income  
tax surtax -

END OF TAPE

CAPCOM Roger. In Washington, the Senate Finance Committee has approved extension of the Income Tax Surtax, but a Senate vote on the bill apparently seemed remote. In Austin, State Representative Ray Lemmon of Houston has been nominated as the National Director of the American Society for Oceanography. Lemmon has proposed a study of the possibility of establishing an institute of oceanography in Texas. This would be the first such institute on the Western Gulf of Mexico. In Minneapolis, Minnesota, the weather bureau after recapping today's weather showing a high of 88 and a low of 72, has noted "snowfall: none." From St. Petersburg, Florida, comes a radio report from a Norwegian Explorer, Thor Heyerdahl which said that the crew of his papyrus boat RA will sail into Bridgetown, Barbados, despite damage from heavy seas. The crew, however, will sleep on an escort vessel. Norman Baker, navigator of the expedition, said the crew was aboard the RA today repairing damage from storms this past week which split the footing of the mast. Part of the broken mast was jettisoned overboard. The vessel was 725 miles east of Barbados. "It is possible but uncomfortable to sleep aboard the RA," Baker said in the radio report. "But the purpose of our voyage is not a test of strength or human endurance." That is the reason why the crew was spending nights aboard the escort vessel Shenandoah, which rendezvoused with the RA on Tuesday. In sports, the Houston Oilers are showing plenty of enthusiasm in their early preseason workouts at Kerrville and Coach Wally Lemm says he is impressed with the fine group of rookies. National League baseball - was it yesterday - Thursday - St. Louis 11, Philadelphia 3; Montreal 5, over Pittsburgh 4; Atlanta 12, Cincinnati 2; San Francisco 14, and Los Angeles 13. American League - we have Baltimore 3 over Cleveland 2, Detroit 4 to Washington 3, Minnesota 8, Chicago 5. Boston and New York was rained out. And in Corby, England, an Irishman, John Coyle has won the world's porridge eating championship by consuming 23 bowls of instant oatmeal in a 10-minute time limit from a field of 35 other competitors. Over.

SC Roger. Houston didn't play yesterday.

CAPCOM That's correct.

SC I'd like to enter Aldrin in the oatmeal eating contest next time.

CAPCOM Is he pretty good at that?

SC He's doing his share up here.

CAPCOM You all just finished your meal not long ago, didn't you?

SC I'm still eating.

CAPCOM Okay is that -

SC He's on his 19th bowl.

CAPCOM Roger. Are you having any difficulties

APOLLO 11 MISSION COMMENTARY, 7/18/69, CDT 14:27, GET 53:55, 169/2

CAPCOM with gas in the food bags like the  
janitor reported?

SC Well, that's intermittently affirmative,  
Bruce. We have these 2 hydrogen filters which work fine as  
long as you don't hook them up to a food bag. But the entry  
way into the food bag has enough back pressure to cause the  
filters to start loosing their efficiency. A couple of times  
I've been tempted to go through that dryout procedure, but  
we found that simply by leaving the filters alone for a couple  
of hours, their efficiency seems to be restored.

CAPCOM Roger, we copy.

SC Their efficiency ranges anywhere from  
darn near perfect to terrible just depending on the individual  
characteristics of the food bags we're putting through it.  
Some of the food bags are so crumpled near the entry way that  
there's no way we can work them loose to prevent back pressure.

CAPCOM Roger.

PAO That's Mike Collins from the spacecraft.

PAO This is Apollo Control at 54 hours,  
6 minutes. Apollo 11's distance from Earth now is 172 748  
nautical miles, traveling at a velocity of 3260 feet per  
second.

END OF TAPE

CAPCOM Apollo 11, this is Houston, over.

CAPCOM Apollo 11, this is Houston, over.

SC Hello, Houston, go ahead.

CAPCOM Roger, 11, as you have probably noticed coning angle on the PTC mode is increased substantially as a result of a - waste water dump, the fuel cell purge and a natural coupling, so it looks like we are going to have to terminate PTC here in a little while and we would like to get your feeling as to rather you are still anticipating - trying to send back TV signals from inside the LM and if so, we will try to provide an attitude that you can hold that will give us high gain antenna lock on the Earth during the TV and LM activation period. Over.

SC Yes, we are still planning - that activity if the coordinates work out all right and we will accept that attitude that you work up for us.

CAPCOM This is Houston, roger, out.

SC Work up an attitude to get high gain is there any way we could get partial sun in one of the two LM sun windows?

CAPCOM This is Houston. We'll have a look at it.

PAO That was Neil Armstrong confirming they will attempt TV at approximately an elapsed time of 56 hours 20 minutes and then the last of the question was by Buzz Aldrin.

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead Houston.

CAPCOM Roger. We have a TV attitude for you if you are ready to copy.

SC Go ahead, ready to copy.

CAPCOM Okay, we recommend stopping PTC at GET of 54:45:00 and this should put you just about the right roll angle. The attitude we recommend is roll 263, pitch 090, yaw 000. This gives you the Earth out of window number 01 in the command module and places the high gain antenna -

END OF TAPE

CAPCOM to 000. This gives you the earth out of window number 1 in the command module, and places the high gain antenna in the CSM window for TV at your convenience. You also have the sun shining in, or shining at the hatch on the LM and if you take down the window shades you should get some sunlight in. Now we're recommending wide deadband. Over.

SC Roger. Thank you, Houston.  
We'll look at that.

CAPCOM Roger up.

SC Houston, Apollo 11. When we pass the proper rolling we're not anywhere near 33 chart. Do you want us to stop at the triangle we find ourselves in and then VERB 49 the three angles you give us.

CAPCOM Stand by.

CAPCOM Hello Apollo 11, Houston. We'd like you to stop at the proper roll angle then to a verb 49 to the roll and pitch. Over. Correction, roll and yaw.

SC Houston, Apollo 11. Over.

CAPCOM Go ahead, 11. Over.

CAPCOM Hello Apollo 11, Houston. You read? Over.

SC Houston, Apollo 11. Over.

CAPCOM Roger, 11. Do you read me?  
Over.

CAPCOM Hello, Apollo 11, Houston. Over.

SC Stand by, Charlie.

SC We're going to come out of

BTC here at 263 roll and then to a verb 49 to the recommended attitude.

CAPCOM That sounds fine to us. Over.

PAO This is Apollo Control at 54 hours 45 minutes. Apollo 11 is 173,997 nautical miles from earth. Velocity is 3,234 feet per second. In the control center, the white team led by Gene Kranz is preparing to relieve Cliff Charlesworth and the green team. Capcom is Charlie Duke. We're estimating the change of shift news conference for 4:00 PM Central Daylight Time.

CAPCOM Hello Apollo 11, Houston. Before you open the pressure equalization valve, we'd like the LM send Delta-P. Over.

SC Okay. Let me check it again.  
It was about 155.

CAPCOM Rog.

SC I read it 158 right now, Charlie.

CAPCOM Roger. Thank you much.

SC Houston, Apollo 11. We're  
(garbled)

CAPCOM 11, Houston. You're about 1 by on this transmission. Say again. Over.

SC Houston, Apollo 11. Do you read?

END OF TAPE

CAPCOM 11, Houston. Here's that 1 by on  
this transmission. Say again. Over.  
SC Houston, Apollo 11 (garble)  
SC Houston, Apollo 11. How do you  
read on the high gain?  
CAPCOM Hello 11. How do you read me?  
Over.  
SC Reading you loud and clear Charlie.  
We just switched to a high gain and we stopped PTC at  
roll 263, pitch 90, yaw 0. How do you read?  
CAPCOM Roger Mike. Your 5 by now on the  
high gain. We're right between the OMNI antennas and  
pretty horrible comm on the OMNIs. We've got you 5 by  
on the high gain and we copy the PTC stoppage. Over.  
SC Okay, fine.  
SC Houston. We're going to open the  
director 2 valve instead of pumping up the cabin.  
( CAPCOM Roger copy.  
CAPCOM Apollo 11, Houston. We're going  
to hand over to Goldstone for uplink, in about 2 minutes.  
We might have a momentary dropout of comm. Over.  
SC All right. Can you hear our master alarm  
in the back, John? That's O2, a little high, coming  
through the amplifier.  
CAPCOM Roger. Copy.  
SC That photo electric cell is a good  
device. It's worked very well.  
CAPCOM 11, Houston. Say again. Over.  
SC I say that photo electric cell  
amplifier for the master alarm is a good device. It's  
working very well, and it's a nice pleasing tone.  
CAPCOM Roger. Copy. Thank you.  
SC Makes you almost glad to get master  
alarm.  
SC Houston, Apollo 11. As a matter of  
curiosity our O2 flow meter is pegged full scale high.  
CAPCOM Roger 11. We copy that here. Over.  
SC Okay.  
SC Boy that transducer's working  
somewhat.  
CAPCOM Roger.  
CAPCOM 11, Houston. We'd like to try to  
attempt to correlate your O2 flow in transducer with the  
flow valve that you've got open. How far open would you  
say you have the repress O2. Over.  
CAPCOM Correction. The Direct O2.  
SC Stand by Charlie.

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SC Okay Charlie. It's not open very far Hard to give you a good reading without shutting it again but the arrows are at about the 1:00 o'clock position. Now I reduced the flow and I'll let it stabilize here. Right now our onboard reading is about .4 and that's with the arrow in the O2 valve at the 2:00 o'clock position. Would you rather have a - comparisons of O2 flow readings or would you rather have valve position comparisons?

CAPCOM Roger. Stand by.

CAPCOM ECOM said they'd like to look at the valve positions. Over.

SC Okay. Well we're holding steady now at 3/10ths of a pound per hour and our cabin pressure is about 54 and I'll close the valve momentarily and then open it again to this position and see how much travel is required.

CAPCOM Roger.

SC It's about 30 degrees of travel Charlie from the closed position which is with the arrow pointing at about 3 to 3:30, 4:00 o'clock.

CAPCOM Roger.

SC Our blowers stabilized now at .6.

CAPCOM Roger we copy. We're reading the same.

SC Okay.

SC We're opening it back to the 1:00 o'clock position.

CAPCOM Roger.

SC Is that enough different positions, or do you want more Charlie?

CAPCOM Mike that's good enough. We're satisfied now. Over.

SC Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, GET 35:00 CDT 15:32, 173/1

SC Houston, Apollo 11, we've terminated directo 2, our cabin pressure is 57 and, as a matter of curiosity, when we turn the off we get a master alarm just like they did in the spacecraft testing.

CAPCOM Roger. Eleven, Houston, we have a little update for you. When you go into the LM, we'd like you to unstow and bring back to the command module the following items, over.

SC Ready to copy.

CAPCOM Roger, we'd like you to pick up the, out of the flight data file, the surface check list, the mission rules no go card, the DIP, APS, RCS limit cutrons, over.

CAPCOM Apollo 11, Houston, the reason we want you to bring those three items back, we'll have some updates for you, for those 3 over.

SC Roger, we figured you would.

PAO This is Apollo Control at 55 hours 10 minutes. Our network controllers just advised that we are receiving live television at Goldstone. We would presume this is a test of the system, similar to what we received from the crew yesterday. The crew is planning to send television from the lunar module when they ingress. Stand by - here's a call from the crew.

CAPCOM Flight configure here at Houston for the transmission. We'll be up in a couple of minutes, over.

SC Rog, this is just for free. This isn't what we had in mind.

CAPCOM Roger.

PAO That was Capcom, Charlie Duke, advising the crew that we are not quite prepared for television reception at this time. You heard Mike Collins respond that this one is for free. We still intend to get the television transmission during the time the crew is in the lunar module, beginning about 56 hours 20 minutes ground elapsed time, which would be about 4:52 PM central daylight time. We are getting a black and white television picture in the control center at this time and we should have that in color by now. An anterior view of the command module looking up into the LM hatch, CSM land hatch area. We can't quite make out which crewman we're seeing up in the tunnel working with the probe and drogue assembly.

PAO Getting a very good view of the work going on in the command and service module tunnel. It appears to be Neil Armstrong working in the tunnel. Working on the drogue and probe assembly. This extremely sharp clear picture is coming to us from about a 175 thousand miles distance from earth.

END OF TAPE

PAO extremely sharp picture is coming to us from about 175,000 miles distance from earth. Presently about 48,000 miles from the moon.

PAO That appears as if it might be all the free TV, as Mike Collins put it. After we got in we expect to get the television transmission from the time the crew is in the lunar module and that period of activity is scheduled to begin in about 56 hours 20 minutes with the ingress to the lunar module. And we understand it's starting to get a picture back again. It was in lock momentarily and now we had it back again. Neil Armstrong up in the tunnel at this point, removing the probe and drogue assembly in preparation for the ingress to the lunar module. A network controller just reported that this television is coming to us on the 210 foot dish antenna at Goldstone, California.

PAO We just saw the probe assembly start to come loose now as Neil Armstrong is -

CAPCOM Apollo 11, Houston. It's a pretty good show here. It looks like you almost got the probe out.

SC Yeah, it's loose now. Can you see that?

CAPCOM Rog, Neil. It's real good.

SC There's not much light up in that area but certainly this TV set should pick it up.

CAPCOM There are some bright spots shining on the probe. Apparently sun shafting on it. Gets just about enough - part to make it out. Over.

SC Hey, how good does it look on the lights?

CAPCOM Oh, okay. You're right.

SC Okay, it's loose now. Coming down.

CAPCOM Roger.

CAPCOM Looks like it's a little bit easier than doing that in the chamber. Over.

SC You bet. It's the only way it's pretty massive but it goes where you direct it.

CAPCOM 11, Houston. That's beautiful picture now, we've got. We're going to have 12 seconds delaying. Adjust and just bringing it down by the optics now.

SC Mike must have done a smooth job in that docking. There isn't a dent or a mark on the probe.

CAPCOM Rog. We're really getting a great picture, here. Over.

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CAPCOM 11, Houston. With a 12-foot cable, we estimate you should have about 5 to 6 feet excess when you get the camera into the LM. Over.

SC Roger.

CAPCOM We can see the probe now.  
A correction, the drogue.

SC Roger.

SC Okay, drogue removal is coming next.

CAPCOM Roger. As we suspected.

PAO Once removal of the drogue is completed, they will have access to the LM hatch and be able to go into the tunnel.

CAPCOM 11, Houston. Now it's a good view of storage area under the couch.

CAPCOM 11, Houston. Looks like it's pretty crowded in there with that drogue. Over.

SC Oh, it's not really bad. This TV cable is getting in the way.

CAPCOM We see lots of arms.

END OF TAPE

CAPCOM We see lots of arms.  
SC The only problem, Charlie, is these TV stage hands don't know where they stand.  
CAPCOM Well, you got to really have a union card there. We can't really complain too much, I guess.  
PAO This unscheduled televis-on transmission has now run about 18 minutes, and we have no estimate at this point as to how long it will continue. Mike Collins reported that it would - we would go ahead with the regularly scheduled one when they are in the LM.  
CAPCOM Apollo 11, Houston. Do you have a little white dot in the bottom of your monitor - TV monitor? Over.  
SC Roger. We do.  
CAPCOM Roger. I guess part of the camera's been burnt out down there. These are really beautiful pictures here, Buzz. Real clear.  
SC Okay. We might have got just a little bit of nothing there. Is it just a one small white dot?  
CAPCOM That's affirmative.  
PAO Have a good view here of the computer display and keyboard assembly with the green lights flashing.  
SC We went up in the tunnel checking the roll angle, Charlie, and it's 2.05 degrees.  
CAPCOM Roger. Copy. 2.05 on the roll cal.  
SC And that's a plus.  
CAPCOM Roger. Plus.  
PAO The reference to the roll cal, or roll calibration index marker in the tunnel, which shows how far off exact 0 the 2 vehicles were when the docking occurred.  
CAPCOM 11, Houston. The tunnel looks pretty clear to us. Somebody going up there now. Over.  
SC It's Mike checking his connectors up there now.  
CAPCOM Roger.  
CAPCOM 11, Houston. The lighting up in there looks very good to us at this time. Over.  
SC I think that's mostly the camera. It's subdued to say the least.  
CAPCOM Roger. It's funny. It's gathering pretty well to us. We see everything quite clearly up in there.  
SC Anyhow, the dock latches look good today just like they did yesterday. Everything up in there looks just fine.  
CAPCOM That sounds fine to us. Over.  
PAO Mike Collins reporting there on the appearance of the latches.

CAPCOM 11, Houston. We can read the decals up there on the LM hatch.

SC Well, let me move it up and see how much you can read.

CAPCOM Okay.

CAPCOM We can see the LM umbilical connection quite well, Buzz. We see you zooming in on one of the decals now. It's - to reset, unlatch handle, latch behind grip and pull back 2 full strokes. That's about all we can make out.

SC You got an A plus.

CAPCOM Thank you very much, sir. At least I passed my eye test.

SC I'm standing six feet from it, Charlie. You can read it better than I can. There's something wrong with your system.

CAPCOM Roger.

PAO An interested observer of these amazingly clear pictures coming to us from more than 175 000 miles out in space is Astronaut Gene Cernan, who got a first hand view of some of this same area of the spacecraft during his Apollo 10 flight.

CAPCOM That's a real good view of the LM hatch handle there, 11. Over.

SC Roger.

SC Looks like we'll be ready to go into the LM early if that's okay with you all down there.

CAPCOM Roger. It's fine with us, Neil. Go ahead anytime you wish. Over.

SC Okay.

CAPCOM 11, Houston. The white spot you see on your monitor - our TV people say it is a burn spot, but they expect it to dissipate after a couple of hours. Over.

SC Roger. Thank you.

END OF TAPE

SC Okay, the dump valve is actuated.  
CAPCOM Roger, copy, then we see it very clearly.  
Is that you Buzz with your hand on it?  
SC Yeah.  
CAPCOM 11, Houston. We're really amazed at the quality of the picture up in the tunnel. It's really superb, over.  
SC It is considering the amount of light up in there. Hey, we are about to open our hatch now.  
CAPCOM Rog. There is that same guy when you opened up the door, why, he is waiting there for you and he turns the lights on.  
SC How about that. It's like the refrigerator.  
PAO That conversation between Charlie Duke and Mike Collins referring to the automatic light that comes on in the LM when the hatch is opened.  
CAPCOM Buzz, the view by your left shoulder there is so good we can see the ascent engine cover, the velcro on it, and that's about all we can make out right now. Now we see the helmets, do we?  
SC We don't see anything loose up there.  
CAPCOM Well, great. Looks good to us. We see the helmet storage space.  
CAPCOM 11, Houston. We got a view of the PLSS there, off the right of our screen.  
CAPCOM 11, Houston. Buzzy already in? Over.  
SC Roger. I'm halfway in, hanging out, or turning around, I guess.  
CAPCOM Roger.  
PAO Buzz Aldrin, reporting that he's halfway into the LM. His view is inside the LM cabin.  
CAPCOM Apollo 11, Houston. We'd like you to read out the LCG reservoir sight level. Over.  
SC Okay. Stand by.  
CAPCOM 11, we have a good view of the window there. It looks like the sun is finally coming through the shade.  
SC Yes, I'm afraid it's - we're just about plus z toward the sun.  
CAPCOM That's affirmative. This attitude put both windows right toward the sun - the LM. Over.  
SC Well, that may be good in some ways, but -  
CAPCOM We had a view, Buzz, of the utility light cord. Utility's on.  
SC Yes, let me show you a view looking the other way.  
CAPCOM Roger. And we see right now the utility light or either the flood light up there.  
CAPCOM I think now I see the utility light is still in the stowage bag. Hey, that's a great shot right there. We see you in there. Guess that's Neil and Mike. Better be, anyway.

CAPCOM We see you waving.  
PAO Buzz Aldrin has apparently carried the camera into the LM with him, showing us Neil Armstrong and Mike Collins back in the CSM.  
CAPCOM 11, Houston. That's really a beautiful shot.  
CAPCOM 11, Houston. We didn't quite decipher that signal that just came from the CMP.  
SC Just saying hello. On the LCG sight gage, you got about - it looks like - the white mark that's in the plunger is about a quarter to three eighths inch out into the green away from the red. Is that what you like to see? Over.  
CAPCOM Stand by. Right, Buzz; that looks good to us. Thank you much.  
SC It is the white index, is it not, that you're interested in comparing whether it's in the red or green?  
CAPCOM Stand by. That's affirmative, Buzz. It looks good. That's a good reading for us. Over.  
SC Okay.  
CAPCOM We had a shot momentarily - a moment ago of the suit disconnect valve.  
SC I'll open up the windows and see what the lighting condition's going to be like.  
CAPCOM 11, Houston. That's a real good view we have of the AOT. You're back there, Buzz, and notice you're taking down one of the window shades. Over.  
CAPCOM The light is superb.  
SC How's the sun coming in? How's the sun coming in from this direction going to affect what you can see?  
CAPCOM It made it really super. The lighting is excellent in the LM right now. We can make out the AOT, the ISA, and the left-hand window - there's a little glare off of that, but the LMP side the - with the shade down it's really excellent. Over.  
SC Well, let's - I'm turned around, why I took the shade off my side first.  
CAPCOM Roger. We copy. The light level for the TV is really excellent. Over.  
SC The lighting in the LM is very nice, just like completely daylight, and everything is just beautiful. A good bit lighter than the tunnel was earlier.  
CAPCOM Roger. We got a good view now of the DEDA and also, Buzz's ATA.  
PAO This ingress to the lunar module came about -

END OF TAPE

APOLLO 11 MISSION CONTROL 7/18/69, GET 55:36, CDT 16:17, 177/1

CAPCOM ACA  
PAO This ingress to the lunar module came about 40 minutes ahead of the flight plan, and we would presume that the unscheduled TV is perhaps merging with the schedule a little bit early.

SC Every thing seems to be in place down there.  
CAPCOM Roger, we got the dump valves in view, over.  
SC Roger.

CAPCOM Eleven, Houston. We see you're removing the ISA now, folding it up, putting it up by the AOT. The instrument pannels are coming into view behind.

SC Yea, I think probably it'd be best since we've done an SPS burn to put it back over the instrument panel instead of putting it up over the plss on the rechart station. Would you care to comment on that one. We can do either, just as easily.

CAPCOM Stand by we'll have an answer for you momentarily.

CAPCOM Eleven, Houston. It's really a super shot of the thing displaying.

SC The vehicle is suprisingly free of any debris floating around, it's very clean.

CAPCOM Roger.

CAPCOM Eleven, Houston. It's pretty hard to describe this view. It's really great.

SC Now you know how we feel.

SC Okay Neils OCS is about 57, 58 hundred.

CAPCOM Copy.

SC And mine is about 58 hundred also.

CAPCOM Copy.

PAO Aldrins hand resting on one of the portable life support systems which will be used on the moons surface.

CAPCOM Eleven, Houston. That's a good shot of Neils PLSS there, over.

SC Yea that's fine.

CAPCOM Eleven Houston just a moment ago we had a good shot of your PLSS Buz, and the two helmet stowage bags, and now behind your left shoulder Buz, we have your DSKY and the ACA.

PAO We're not quite sure who's holding the camera at this point. Apparently it's drifting freely inside the cabin. Or more likely attached to some convenient point within the LM cabin.

SC We're going to go ahead and take all the loose data on back into the command module, Charlie.

CAPCOM Roger.

APOLLO 11 MISSION COMMENTARY, 7/18/69, GET 55:36, CDT 16:17, 177/2

PAO This television transmission has now been running about 42 minutes, and the spacecraft now about 176 thousand miles from earth.

CAPCOM Apollo 11 Houston. Buz it appears that you didn't put on the sun filter and viewing the sun through the AOT, over.

SC Yea, unfortunately it looks like it's down a little bit more towards (garbled) than I can be able to see in the MT.

CAPCOM Roger.

SC We've got a beautiful view of the side of the command module out of the AOT looking in the left rear deton.

CAPCOM Rog.

SC I can see the hatch and all the EVA hand rails. First time we've seen the silvery outside of the command module. I can read the letters on the hatch cover, it's a boost cover release, and the big yellow arrow that points toward the opening place where the 20B goes.

CAPCOM Rog. Great shot now back down into the -

SC And left on the - -

CAPCOM Go ahead Buz, over.

SC Say again.

CAPCOM I was just saying we got a great shot looking back into the command module.

SC Okay. And the left decent I can see the rendezvous radar, and I move to the forward detent and that's about all I've got. I'm looking eyeball to eyeball.

CAPCOM Rog.

PAO Neil Armstrong has apparently been holding the camera, looking back down through the tunnel it appears now that he's handed the camera to Buz Aldrin. As he is still looking back through the tunnel we see Mike Collins in the background there.

SC Charlie is there any concern about the duration that we ought to have the window shades open?

CAPCOM Stand by.

SC We don't have any circulation in here and it might get a little on the warm side.

CAPCOM Rog.

SC We'll put up a couple of hoses in the command module here and get a little circulation going.

CAPCOM It sounds like a good idea, over.

END OF TAPE

CAPCOM Apollo 11, Houston. As far as the window shapes go in this LM is nothing except for crew comfort. I don't think we've got any systems problem. Be sure to put them back up when you egress. Over.

SC That we will do.

SC Charlie, I'll give you a view out of the overhead window, back looking at the Command Module, right hand rendezvous window.

CAPCOM Roger.

CAPCOM Well we see it now. Thanks a lot Buzz. It's a good view through the over head.

SC One (garble) is on by the overhead.

CAPCOM Roger.

CAPCOM There we go. We've got it now.

SC There wasn't very much debris in the Command Module or the LM. We found very few loose particles of bolts, nuts and screws and lint Very few in each spacecraft. They were very clean.

CAPCOM Roger. Sounds good.

CAPCOM 11, Houston. We have a good view out of the rendezvous - correction the overhead window of the LM. We don't see anybody standing back at it though. Over.

SC Charlie can you see Mike's two eyeballs staring out through the nautical window?

CAPCOM 11, Houston. Stand by. We haven't picked him up yet.

SC They're looking through a lot of layers of glass.

CAPCOM 11, Houston. We had a slight glimpse of Mike in the rendezvous window at that time. It's pretty murky looking in there though.

SC Okay. Here he is. I've got him. I've got him on the monitor now.

CAPCOM Okay. We see him staring back at us now. Hello in there.

CAPCOM Apollo 11, Houston. Our recommendation to the ISA is to store it back over the instrument panel. Over.

SC Roger. Will do.

PAO This transmission has been running about 54 minutes at this point.

CAPCOM 11, Houston. We can make out the markings on the panel. We read system a assent fuel, S in oxidizer. QUADS 1, QUAD 4. It's really unbelievable the definition we're getting down here off that little camera. Over.

CAPCOM We can even see the barber pole on

CAPCOM - a dog bag.

CAPCOM We can read the markings on the instruments for the glycol pressure quantity, quantity, TC 02. You can read the scale on the eight ball. Over.

CAPCOM 11, Houston. We seen across these barber pole and we had the Velcro patches back up to the RCS systems now. We can see the markings on the meters, green and red bands, in limits. We see you raised the cover on the abort stage. We don't recommend that.

SC Yes. We're going to tape that one over.

CAPCOM Roger.

SC Going to tape that one over.

CAPCOM We concur.

SC The restraints in here do a pretty good job of pulling my pants down.

CAPCOM Roger. We haven't quite got that before the 50 000 000 TV audience yet.

CAPCOM 11, Houston. That's a good view of the eight ball. We see - you can read the OFF light there.

CAPCOM You can see the signal strength meter for the radar - read the numbers on it.

PAO At this point, we have had to take the color down momentarily. We - -

END OF TAPE

PAO At this point, we've had to take the color down momentarily. We've run out of tape in the color conversion recorder. We estimate we'll have the black and white for about 5 minutes while the tape changes in process and then continue to convert in color after that point.

CAPCOM Roger, stand by. We'll have an answer.

CAPCOM 11, Houston. On that TV, our commentary - The monitor I was looking at was delayed about 12 seconds, 12 to 15 seconds while it went through our color converter. It was probably - You thought I was praising, but we were looking at it 15 seconds after you broadcasted. 11, Houston.

SC We understood that, Charlie.

CAPCOM Okay, on the LM cameras, we'd like you to do it on LOI day with the LM power. Over.

SC Okay, that's what we'll do.

PAO The black and white view that you're seeing now is the unconverted color pictures that comes down from the spacecraft. The flicker, of course, is taken out in the conversion process. We've now been receiving television pictures from the spacecraft for about 1 hour.

SC Checklist stowage packet, it's got a 16-millimeter camera in it, and it's got this little cylinder and I guess - I don't understand what it is. Maybe you can tell us.

CAPCOM Roger. Stand by. We can't figure it out either.

SC It's got an arrow on the back and it says "turn", but I'm afraid to turn it.

CAPCOM 11, your friendly geologist says it's the camera crank. Excuse me, for the 16 sequence camera if it jams. Over.

SC All very well. Thank you.

PAO The reference to the friendly geologist refers to Astronaut Jack Schmitt who is here in the control center.

SC Here's that word again. The ancillary stowage container.

CAPCOM Rog.

PAO Now we're back with the color.

CAPCOM The shades couldn't quite hack it, there, Buzz. Over.

SC Houston, 11. Are you still getting high bit rate off the OMNI's at this distance?

CAPCOM Stand by, Mike.

CAPCOM Apollo 11, Houston. About 50 percent of the time we're getting high bit rate off the OMNI's when you're in PTC. Over.

SC Okay, thank you.  
CAPCOM You're welcome.  
CAPCOM Apollo 11, Houston. Neil, with  
this attitude, you look like you're about 12 feet along.  
SC It seems like I always find  
myself upside-down in whatever I'm doing around here.  
CAPCOM Apollo 11, Houston. Could you  
give us a few comments on your crew comfort with the CSM  
hoses moving you around? Over.  
SC Well, it's picking up a little  
bit of circulation in here.  
CAPCOM What do you estimate the  
temperature is, Buzz? Over.  
SC I'd say maybe 73, 75.  
CAPCOM Rog.  
SC It's hard to tell at this  
density and pressure of gas, but comfort level is about the  
same as the command module. It was warmer, or stuffier when  
we first got in, but it seems to be improving.  
CAPCOM Houston copies that.  
CAPCOM 11, Houston.  
SC You may be able to see some -  
CAPCOM Go ahead.  
SC Some particles jumping around  
on your screen. That's just dust particles that are being  
eliminated by sun shafting in the window.  
CAPCOM Roger. They're very clear now.  
Over.  
CAPCOM And that's a good view of Neil's,  
correction, of Buzzes circuit breaker panel there.

END OF TAPE

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CAPCOM And that's a good view of Niels, correction of Buzz's circuit breaker panel there.

SC I can just barely see the hand rail on the front porch from this position on the right hand window.

CAPCOM Roger.

CAPCOM Eleven, Houston. Our view of the panel eleven is, gets brighter then darker. Are you changing the F-stop at all, over.

SC Now what's happening is we get pretty close to the window now and then drives the automatic light control into the stop I think.

CAPCOM I think that's right.

SC Yea I had the switch on outside while I was going through the overhead window. That may be what's contributing to some of it.

CAPCOM Roger. Eleven, Houston, we seem to be picking up a few more dust particles now. We see them quite clearly on the screen now, over.

SC Yea I'm choking on one ever so often.

CAPCOM Eleven, Houston. Your show is going out to the US now. We're about to get this satellite up. It'll be transmitted to some other countries after that, over.

SC Roger. I'm checking out this window bracket. Where I'll be putting it for the EVA pictures of Neil going down the ladder.

CAPCOM Roger.

SC Apollo 11, Houston. We keep marveling about the color and the clear of your picture. It's really difficult to describe. It's just perfect, over.

CAPCOM And Eleven, it doesn't look like you're having too much trouble with that bracket up there, Buzz.

SC Roger, those new knobs really make it easy to twist the thing and get it cinched down quite tight.

CAPCOM Rog.

CAPCOM Eleven, Houston. Buzz, how does the alignment look?

SC It looks pretty good as well as I can tell without the gear extended. I can't get a real definitive answer, but you couldn't fix it any place to see much more out of the window without holding it for the whole time.

CAPCOM Roger looks like to us it's going to work real well.

SC Give me enough room to - Yea I think so.

CAPCOM Buzz we see you putting your window guard in place there and back up to the ISA now.

SC Houston ask if they know if the 90 degree bracket can be stowed in the commanders stowage assembly.

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CAPCOM Stand by.  
CAPCOM Eleven Houston. Buzz are you still  
looking for that 90 degree bracket, over.  
SC Yea, he's looking for it now.  
CAPCOM Roger, we'll have a word for you in just  
a moment.  
SC Our monitor shows pretty good, clear pictures  
from this angle. Alley found the 90 degree bracket.  
CAPCOM Roger, it's really a super picture. We  
got the ACA, your ACA, the disc picture of the throttle, the  
90 degree bracket. We see your handles, and now over to the  
bracket.

END OF TAPE

CAPCOM start your handles and now  
over to the bracket.

SC That's about the position we'll  
be putting the camera in after the initial descend on the  
ladder, and it'll be taken 1 frame per second for most of  
the EVA.

CAPCOM Houston copies out.

CAPCOM That's a real good view of that  
camera.

SC Our monitor is a little bit  
wavey, so it's hard for us to tell when we're - when we've  
got a steady picture for you.

CAPCOM 11, we have no complaints at  
all. We don't see that waviness on our picture. It's just  
really great. Over.

SC Do the edges of the window look  
like straight lines to you?

CAPCOM That's affirmative.

SC Okay, they don't in our monitor  
and that leads us to make some corrections to the camera,  
which probably aren't required sometime.

CAPCOM Buzz, we have no complaints at  
all. It's a magnificent picture.

PAO We've been receiving television  
now from the spacecraft for about an hour and 20 minutes.  
Apollo 11 presently 177,000 miles from earth.

CAPCOM What was that, Buzz, you're  
chasing now?

SC That was me picking up some  
particles of paint that were floating through the air in  
front of our camera, there.

CAPCOM Rog. Now we got it. It  
appears to us that Neil's to check the velcro map there.

CAPCOM Okay Buzz, we see the card up  
now.

SC Okay, for those of you that  
don't know, this is where we log most of our data for each  
of the LM maneuvers and we have another card like this but  
the timeline broke that we had layed down on the table in  
front of the - down there at this play keyboard, and it's  
on this timeline that we have all our procedures. And we  
obviously have to hold these in place in zero "G" so we make  
use of the velcro patches on the back and on the table so we  
can attach these down here and then we just turn the pages  
over when we go to a new sequences in our timeline of  
procedures.

CAPCOM Roger.

SC And we're ready to copy DOI pad.

CAPCOM Rog. We'll have the FIDOs work that one up for you momentarily.

CAPCOM 11, Houston. That was a good shot of panel 2 now we got panel 3 in view with the temp monitor switch. The ... stationing control panel, we see now, with the mode control switches. Now we can -

CAPCOM 11, that's real good camera work.

SC That'll be the most unusual position a cameraman's ever had, hanging by his toes from a tunnel and taking the picture upside down.

CAPCOM Roger. You're doing a super job. We got a good view of the cross pointer, there. We had a good view of the tapemeter.

SC We're giving you a picture now, of the floor of the cabin. I think you can see the - one of the two portable life support systems backpacks here in the center, and on each side, we have two helmet visors. I'll remove one of them and show you a little closer view of what this looks like.

CAPCOM Roger.

SC Inside the helmet visors, are the EVA gloves, with the blue tips. I'm about to take those out now.

CAPCOM Rog Buzz. That's a great shot now that we're getting of the helmet, the EVA visor, and also the EVA gloves in the background.

SC Okay. You did say this was going out now, didn't you?

CAPCOM Stand by. I think so.

CAPCOM 11, you got a pretty big audience. It's live in the US, it's going live to Japan, western Europe, and much of South America. Everybody reports very good color, and appreciates the great show.

SC Roger. I understand. Thank you.

CAPCOM Buzz -

CAPCOM your EVA visor. Stand by. Appreciate it.

CAPCOM I like the good view of Mr. Collins down there. We finally see him again.

SC Hello there, earthlings.

CAPCOM Hello there.

END OF TAPE

CAPCOM 11, Houston. We noticed when you were scanning over panel 2 a moment ago, 1 and 2 the 2 8 balls were slightly in disagreement. Control said he'd like to AGS the line there.

SC Yes. One of them's AGS, one of them's PNGCS. The problem is, we don't know whether to line AGS to PNGCS or PNGCS to AGS.

CAPCOM Stand by.

CAPCOM Lar and Chris says he can tell you.

SC Okay to them both.

CAPCOM Roger.

SC It's like old home week Charlie to get back into the LM again.

CAPCOM Roger. I can imagine.

SC It's a ... from the bottom of the LM to the aft bulkhead of the Command Module. Must be about - or 16, 20 feet. It's not a disorienting one at all but it's most interesting to contemplate just pushing off from one and bounding on into the other vehicle all the way through the tunnel.

CAPCOM Roger. Must be some experience. Is Collins going to go in and look around?

SC We're willing to let him go but he hasn't come up with the price of the ticket yet.

CAPCOM Roger. I'd advised him to keep his hands off the switches..

SC If I can get him to keep his hands off my DSKY, it'd be a fair swap.

CAPCOM Roger.

SC That's why I've been eating so much today. I haven't had anything to do today. He won't let me touch it any more.

CAPCOM Roger.

PAO It appears now that we have a view of earth out the window.

CAPCOM 11, Houston. If that's not the earth, we're in trouble.

SC That's the earth and we have a very good view of it. Today they're a few more cloudbands on than yesterday when we came down to you but it's a beautiful sight.

PAO That description from Neil Armstrong?

SC We had some horizontal banding in our TV monitor. Are we transmitting that to you or do you have a clear picture?

CAPCOM Neil we have a very clear picture. The only thing that we see is a little white dot in the bottom of our screen which our TV guy says is an apparently burned out spot in the camera but it should come back. Over.

SC Roger. We have that in our monitor also.

CAPCOM 11, Houston. We do have 3 lines across our TV. I thought it was just a transmission problem but everybody's telling me now that it's probably on the downlink. Over.

SC No. Those are the same 3 ones that we have.

CAPCOM Okay.

SC How far out are we now, Charlie?

CAPCOM Stand by. Give you exact figure.

SC If you notice the difference between yesterday and today. This is large in everything as we continue.

CAPCOM Roger. If you think we're smaller, your now 177 000 miles out. Over.

SC All right. That's nautical miles?

CAPCOM That's affirmative.

CAPCOM 11. We -

SC I'm still on.

CAPCOM Go ahead. Over.

CAPCOM 11, Houston. We see - still see the banding along the intratropical convergence. I guess the most predominate one now is around the - up in the - around the equator slightly north of the equator.

SC That's the way it looks Charlie.

SC Same as yesterday.

CAPCOM Roger.

SC Just keep the Pacific Ocean nice and clear and calm on splash day is all we ask.

SC Charlie. I'd like to say hello to all my fellow scouts and scouters at Farragut State Park in Idaho having a national jamboree there this week and Apollo 11 like to send them best wishes.

CAPCOM Thank you Apollo 11. I'm sure that if they didn't hear that, they'll get the word through the news, so they'll appreciate that.

CAPCOM 11, Houston. We have your sub - spacecraft point is just off the western coast of South America, directly south of about Mexico City. Over.

SC That looks like what we observe from here.

SC And we're going to turn our TV monitor off now, for a short bit, while we have some other work to do. Apollo 11 signing off.

CAPCOM Roger 11. Thank you very much. That was one of the greatest shows we've ever seen. We sure appreciated it. Over.

PAO This is Apollo Control. That

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PAO television transmission lasted about 1 hour 36 minutes according to our first rough calculation. And during that period of time, the spacecraft traveled something over 2000 nautical miles - -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, CDT 17:17 GET 56:36:00 183/1

PAO - one hour 36 minutes according to our first rough calculations. During that period of time, the spacecraft traveled something over 2,000 nautical miles.

CAPCOM Hello Apollo 11, Houston. Could you give us an idea of about how long it will be before you start close - closing the LM back up? Over.

SC We got a little more work to do up here - Charlie, we are going to make sure that we have everything transferred around and stowed the way we want it. Try to get a little bit ahead on tomorrow's timeline. I suppose we could be out of there in another half hour or so if it was necessary.

CAPCOM Roger, Neil. We are not trying to push you. We are just trying to get an idea of about water dumps and about starting up the PTC again. Take your sweet time over.

SC Okay, we would like - to - get a flight plan update from you for the next couple of hours here. When you think what the various constraints might be and what - what order you might like us to do things.

CAPCOM Roger, standby, we'll have that to you in a moment.

PAO This is Apollo Control at 56 hours 51 minutes. Buzz Aldrin has now been in the lunar module for a little over an hour and 13 minutes. We estimate that Neil Armstrong has perhaps been in the LM about 15 or 20 minutes less than that. Due to the length of that television transmission, the change of shift press conference has been cancelled. The participants were unable to wait for the duration of the press conference and with other duties and the press conference has been cancelled. At 56 hours 52 minutes, this is Apollo Control.

END OF TAPE

CAPCOM Hello, Apollo 11, Houston. Mike, we'd like to go ahead and do a waste water dump. We'd like you to dump it all the way down to zero. Over.

SC Roger. We copy that, Charlie.

SC How did that work, Charlie?

SC Houston, 11.

CAPCOM 11, Houston. Did you call? Over.

SC Roger. Just noticed that the mast that the EVA light is on is charred brown. It looks as though it took quite a beating during launch.

CAPCOM Roger.

SC The EVA light still does work.

CAPCOM Roger. We'll let the stand guys look at this. We'll be back with you with what we think. Over.

SC Okay.

CAPCOM 11, Houston. We were wondering, Neil, with your closing time in on the TV, if you were going to turn it off. It's indicated that you might be considering turning it back on. We were wondering whether we want to keep the lines up. Over.

SC Well, we want your recommendation on that. I think we would just as soon terminate the TV, but if you have a commitment to keep, we'll be more than willing to turn it back on.

CAPCOM Roger. Stand by.

CAPCOM Apollo 11, Houston. We'd like to terminate the TV. We think we got a really good tape. That hour and a half show was superb, and we'd like to pick up TV - correction - PTC at about 58 hours. Over.

SC Roger. PTC at 58 hours.

CAPCOM And we'll have the remaining proxies in the flight plan soon. Over.

SC Okay. Fine.

PAO This is Apollo Control at 57 hours, 3 minutes. The decision as you heard relayed up to the crew there, that we would go into the passive thermal control mode with the spacecraft in a slow roll at 58 hours in the flight plan. I would rule out further television for today. I would also like to repeat that the change of shift press conference for the previous shift was cancelled due to the length of that television transmission, and we do expect to have a change of shift briefing following this shift probably between 11:30 and 12:pm CDT. At the present time, Apollo 11 is 178 236 nautical miles from Earth, and the velocity has dropped down now to 3146 feet per second. At 57 hours, 4 minutes, this is Mission Control, Houston.

CAPCOM Apollo 11, Houston. Our recommendations on the activities the next hour or so as far as flight plan goes are: continue your LM familiarization as desired until

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CAPCOM about 58 hours, then ingress to the CSM, close the hatch, and establish PTC shortly thereafter. Over.

CAPCOM And Apollo 11, Houston. Terminate the water dump. Over.

SC Okay. Okay. Water dump being terminated now.

END OF TAPE

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SC Houston, Apollo 11.

CAPCOM Eleven, Houston, go ahead.

SC Roger, Houston. I'd like to do a P52 option 3 and treat the platform up prior to starting the PTC, over.

SC Roger, eleven, stand by.

CAPCOM Eleven, Houston, that sounds like a good idea to us, go ahead.

SC Okay, and the platform's looking pretty good to me. It looks like worst axis drift is .01 something degrees per hours. Is that about what you figure?

CAPCOM Eleven, Roger, we've had reports, all the marks have been good, the last couple of times you've run them. Just a moment, I'll get you some information on the apparent drift rate.

SC Okay over, and thank you.

SC You got the maroons on?

CAPCOM Say again eleven.

SC I say you got the maroons on now?

CAPCOM Not permanently Mike. Just have a stand by here while Charlie's out checking how to use that special tool on the camera. The maroon will be on tomorrow.

SC Okay, nice to hear your voice, how's everything going?

CAPCOM Everything's going smoothly here. We sure enjoyed the show this afternoon, Mike.

SC Okay.

CAPCOM Eleven Houston. We'd suggest you go ahead and do the P52 first and we'll take a look at the angles and give you some new drift rates after taking a look at them, over.

SC Alright, fair enough.

END OF TAPE

CAPCOM Apollo 11, Houston, over.  
SC Go ahead, 11 here.  
CAPCOM 11, Houston. Little information to you there CDR. We all have taken a momentarily brief respite from our work to have some special - to have a bite of special moon cheese that is - I understand that it has been sent directly to us from Wapakoneta.  
CAPCOM Wow' (Laughter) Congratulations - your own hometown, over.  
SC No, we can't - we can't pronounce it either. I think you will enjoy that. They make a fine brand of cheese.  
CAPCOM Roger, there, I'll polish up the grammar for the next trip.  
CAPCOM Houston 11, you are looking at the NOUN 93 and I'll proceed when you copy them.  
CAPCOM 11, Houston. We got them.  
SC Okay.  
CAPCOM Hello Apollo 11, Houston. We would like POO and accept. We have a DELTA H update for you, over.  
SC All right, Charlie, just a moment.  
SC Houston, Apollo 11, POO and accept.  
CAPCOM Roger.  
CAPCOM Apollo 11, Houston. We got the load in. The computer is yours, over.  
SC Houston, rog.  
CAPCOM Hello Apollo 11, Houston. We would like for you to stir up the cryos now, over.  
SC Houston, Apollo 11, rog.

END OF TAPE



PAO This is Apollo Control. That was Neil Armstrong reporting that they are now reinstalling the probe and drogue, which is just about on the flight plan schedule, and they reported that they would be putting the spacecraft in a slow roll shortly to maintain passive thermal control. In that mode the spacecraft rotates at the rate of about 3 revolutions per hour to maintain even heating. We have a precise time on that sphere of influence change, the point of which the moon - for calculation purposes here. Mission Control, comes under the predominate influence - the spacecraft comes under the predominate influence of the moon's gravitational field, and we now calculate that that will occur at 61 hours, 39 minutes, 55 seconds, ground elapsed time.

CAPCOM Hello, Apollo 11, Houston. Mike, there's no wait required where REG's are steady you can proceed on. Over.

SC I'm doing it, Charlie.

CAPCOM Roger.

SC The tunnel's all taken care of and drogue, probe and hatch all back in.

CAPCOM Roger. Copy. Out.

CAPCOM Hello, Apollo 11, Houston. We have some new additions to your alternate contingency checklist, if you would break that out. Over.

SC Stand by.

SC Okay, Houston. 11's ready to copy.

CAPCOM Roger, 11. If you'll turn to page F/2-22. Over.

SC Okay, I have F/2-22.

CAPCOM Roger, Neil. Under column L - that's column Lema, line 06. The new data is 00001. Line 07, the new data is 02134. Over.

SC Okay, I have in F/2-22, column Lema, item 6, 00001. Item 7, 02134.

CAPCOM Roger, that's correct. Thank you much. Out.

CAPCOM 11, Houston. For your information, those 2 entries are an update to your Delta-H that we have already uplinked into the CMC. Over.

SC Roger. Thank you.

SC Well, what was I marking on, Charlie, about an 18 parameter line or what?

CAPCOM Our update puts you to the Delta-H to 35 parameters, Mike. Over.

SC Okay.

END OF TAPE

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CAPCOM Hello Apollo 11, Houston. We've got some  
switch positions for you for the high gain, over.

SC Okay, go ahead.

CAPCOM Roger, Buz. Select bravo, omni, high-gain  
track to manual beam wide, over.

SC Okay, Bravo, omni track manual and beam Y.

CAPCOM Roger, and your high-gain angles are,  
minus 50 on the pitch, 270 on the yaw, over.

SC Okay, going there now.

END OF TAPE

CAPCOM Hello, Apollo 11, Houston.  
We have some updates and some things we'd like to talk to you about, if you aren't in the middle of your meal. If it's convenient any time for you, we're ready with some updates. Over.

SC What are th updates going to apply to?

CAPCOM Roger. We have a couple of changes on the LM mission rules NO/GO for your NO/GO card, Neil. One slight change on the APS DPS fuel and temp pressure cards, and we have a change to the procedure for the secondary radiator leak check, which is to be formed at - performed at 71 hours tomorrow, and also some indications that we have a couple of landing site obliques stowed in the wrong place. Over.

SC Okay, if any of those in the flight plan. The secondary radiator, for example.

CAPCOM That's affirmative. The secondary radiator leak check is called out in the flight plan at 71:20. That procedure is listed in your launch operations book on page 2-9, L2-9. We'd like to change that procedure. Over.

SC Okay. Stand by.

SC Charlie, on the secondary leak check, just read us verbatim like you want, and I'll copy directly into the flight plan and not fool around with the checklist.

CAPCOM Roger. That's fine if you're ready to copy, stand by.

SC Ready to copy on the leak check.

CAPCOM Roger. It's monitor the secondary accumulator quantity. Step 2 is secondary glycol to radiator valve normal for 30 seconds then bypass. If no decrease in secondary accumulator quantity, - Are you with me?

SC Yeah, I'm with you.

CAPCOM Okay. If no decrease in secondary accumulator quantity. Secondary glycol to radiator valve to normal. Next step, secondary coolant loop pump AC1 or AC2. After 3 minutes, verify glycol discharge secondary pressure 39 to 51 psig. Also verify secondary EVAP APS TEMP has changed. Next step, secondary coolant loop pump, off. Secondary glycol radiator valve to bypass. That is the procedure. Over.

SC Okay. I read back monitor secondary accumulator quantity, secondary glycol radiator valve, normal for 30 seconds then to bypass. If no decrease in secondary accumulator quantity, secondary glycol to radiator valve to normal. Secondary coolant loop pump AC1 or 2. After 3 minutes, verify glycol secondary discharge pressure 39 to 51 psig. Verify secondary evaporator outlet temp has

SC changed. Secondary coolant loop, off. Secondary glycol radiator valve to bypass. And what's the reason for the change, Charlie?

CAPCOM Roger. Stan is concerned that our present procedure as shown in the checklist does not really flow a glycol through the radiator and they want to verify that we do not have a plugged secondary radiator. Over.

SC Okay. They didn't have any abnormal indications in that system, so far?

CAPCOM Negative. This is the procedure that came up with. It's just a check, Mike. Everything's looking great to us. Over.

SC Okay, Charlie.

SC Charlie, we'll get back with you on these other changes in a few minutes. Okay?

CAPCOM Roger, Neil. No hurry. Over.

END OF TAPE

PAO This is Apollo Control at 59 hours, 9 minutes. Apollo 11 now 182 000 nautical miles from Earth, and the velocity down to 3072 feet per second. We've had very little conversation from the spacecraft in the past 40 minutes or so. At this time the flight plan calls for the crew to be getting ready to begin their eat period. That would be followed by a 9 hour rest period. We have one change to the flight plan to pass along. The television transmission which had been scheduled at 100 hours, 20 minutes to 100 hours, 50 minutes in the flight plan has been deleted. This transmission was to have occurred during the formation flying prior to the powered descent to the lunar surface. The decision to delete the TV transmission from the flight plan was made due to a lack of available satellite channels to relay the signal from the tracking site of Madrid to Houston for conversion. The intermittent music that we're getting is apparently coming from the spacecraft. The crew has onboard portable tape recorders with music on the tapes. As they store their own comments on the tape, the music of course is erased, and apparently the music is triggering the VOX operated microphones and we're getting intermittent music down from the spacecraft.

CAPCOM 11, Houston. We were wondering who's on horns.

SC Back in Houston?

CAPCOM We just had a little music there.

SC I just had the urging, to.

CAPCOM Roger. That was good. You can keep it coming down, 11.

SC Okay.

SC Because it's a special occasion today, Houston. This is the third anniversary of Gemini 10.

CAPCOM Roger. Happy anniversary.

SC Stay there.

PAO This is Apollo Control. That comment a moment ago about the tenth anniversary of - about the third anniversary of Gemini 10 came from Mike Collins, who along with John Young flew the Gemini 10 mission, July 18 through July 21, 1966.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/18/69, GET 59:16, CDT 19:47, 192/1

PAO about the third anniversary of Gemini 10 came from Mike Collins, who along with John Young flew the Gemini 10 mission, July 18th through July 21, 1966. The brief bit of music that we got from the spacecraft was coming to us from a distance of 182 thousand 190 nautical miles.

SC Houston, Apollo 11, ready to copy your update.

CAPCOM Roger, stand by.

CAPCOM Okay Buzz, the first item, is that we have indications that your landing sight obliques are not in the proper position. If you will check we think that the intermediate scale landing sight oblique is stowed in the CSM lunar land mark book. We think that the large scale, landing sight oblique is stowed in the back of the LM lunar surface map book, over.

SC I think I heard you Charlie, but I'm not sure that I understand.

CAPCOM Roger, according to our storage list the landing sight oblique should be in the transfer bag. In the back up set of data, the intermediate scale oblique is in the CSM lunar landmark book and the large scale oblique is in the back of the LM lunar surface map book, and that's the reason we think that they might be, not where you think they are, over.

SC Okay, we've got three obliques. The last one is one I asked for recently. It's just a blow up of the second one. The first one is one that's got dotted lines on it, indicating hidden view and 50 degree LPD, and all three of those are in the transfer book, over.

CAPCOM Roger, fine. We were wrong in our back up set. We had those out of place. Looks like the on board data is good. We just wanted to let you check on that one. We have an update on the APS DIPS fuel cord, that you place on the panel. It's a typo error. If you'll break out that little card, we've got to correct that typo error, over.

SC Rog.

SC Okay, I got it.

CAPCOM Rog, Buzz. Under the DIPS column, on the pressure side. You go down to the fourth item to the pressure greater than 150 PTCA should be greater than 65 percent, over.

SC Okay, it's greater than 1.8 but less than 65 and greater than 150 for greater than 65.

CAPCOM That's affirmative Al.

CAPCOM And we have three items on the mission rules no go card, if you are ready to copy those, over.

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SC Okay, I've got the mission rules no go.

CAPCOM Roger Buz. First entry is on the EPS, under AC bus A. The line extends all the way to high gate. Actually, the line should read at DOI it would be no go AC bus A. After that the no go would be both buses. So if you will just pencil in both buses from TDI through high gate it'll be - -

END OF TAPE

CAPCOM - both busses from PDI through high gate. It will be correct for that line, over.

SC Okay, I got that AC buss A for DOI and both busses no go for PDI on.

CAPCOM That's affirmative up until high gate. You can stop at - the line in front of the column 5 minutes to low gate. Now the next line is under the G&C exchange, pitch and roll GDA. You can scratch that line completely, over.

SC Roger, got it.

CAPCOM Okay, Buzz. Last entry is down under RCS and it is a typo error under the three - in the line three axis attitude control. We proceed to the right at PDI plus 05 you'll see one axis. The line goes all the way to low gate to touchdown. That's incorrect. The line should stop under 5 minutes to low gate, over.

SC Okay, we are stopping at it 5 minutes to low gate.

CAPCOM That's affirm. That completes that card. The rest of the update are just really for your information based on our 58 hour platform - look at the platform. We are really in good shape. Your gyros have almost no drift in them since - plotted update we were looking at X of a minus 2.24 MERU, Y of . plus .87 Z of minus .11. Since the update, which was based on the 52 hour P52, I believe. We gave you a X drift of plus .79, yaw of plus 1.06, Z of plus .02 MERU. I see between the 52 hour and the 57 hour alignments work did not really give us enough time to get a real good, completely valid update on the drift check. So we're real satisfied with the way the gyros are looking. The PIPA'S are looking great also. We are in real good shape with those also, over.

SC This is Apollo 11, radio check.

CAPCOM Roger, reading you fly by OMNI; over.

SC Okay, that clear. You cut out when you were talking about the platform something about 52 hours after that, we never heard you again.

CAPCOM Roger, guess we were changing antennas standby. That's affirmative, 11. We were swapping antennas on you down here. Basically the word here is that we have a real good platform, very small drift on the gyros and very small drift in our PIPA'S, over.

SC Roger, thank you. And I would like to have a few words of clarification if you will give them to me on the RCS reel, what that change of pitch may mean.

CAPCOM Copy, a few words of clarification on the RCS, oh roger. The update there, Neil, you are speaking of about the one axis down to 5 minutes of low gate.

SC Yeah, that's right. I'm not quite sure what that really means (garble).

CAPCOM Standby, I'll make sure I got my story straight with Control. Standby.

SC Okay.

CAPCOM 11, Houston. On the RCS, what we

APOLLO 11 MISSION COMMENTARY, 7-18-69, CDT 19:57 GET 59:26:00 193/2

CAPCOM are saying is - if we lose control about one axis prior to low gate, we would recommend an abort. This would require a - a loss of - of two distinct jets which is not very probable but that is what we are recommending. After low gate we would - continue on. We would recommend that we continue on to attempt a landing, over.

END OF TAPE

CAPCOM Continue on to attempt the  
landing. Over.  
SC Roger. I think I owed him that.  
CAPCOM Rog.  
SC Charlie, did you you say had  
some updates for me from the lunar surface book?  
CAPCOM Apollo 11, say again. You were  
cut out. Over.  
SC Roger. Did you say you had some  
updates for us in the lunar surface book. Over.  
CAPCOM Negative. At this time, we  
do not have any updates for the lunar surface book. We  
wanted you to have it just in case. Over.  
SC Rog. You were cut out that time.  
CAPCOM Roger. At the present time, we  
do not have any updates for you on the lunar surface book.  
We are thinking about some, and kick him around, but they're  
very minor changes. Over.  
CAPCOM 11, Houston. Did you copy that  
transmission?  
CAPCOM Apollo 11, Houston. We swapped  
antennas on you again. I say again that we do not have any  
lunar surfaces update - book updates at this time. We're  
considering a few minor ones, but we're ... around the MOCR  
Over.  
SC Apollo 11. I understand.  
SC Houston, 11. We have a current  
status report for you.  
CAPCOM Roger. Go ahead, 11.  
SC Okay, radiation CDR 11009,  
CMP 10010, LMP 09011. No medication.  
CAPCOM Roger, 11. We copy for the  
radiations and we're considering this PTC looks sort of  
weird to us so we're considering stopping and starting over  
again and we'll be with you in a couple of minutes. Over.  
SC Okay.  
CAPCOM Apollo 11, Houston. Would you  
give us the LM CM Delta-P as reading? Over.  
CAPCOM Hello Apollo 11, Houston. We  
switched the antennas on you again. Would you please give  
us the LM CM Delta-P reading? Over.  
CAPCOM Hello Apollo 11, Houston. Over.  
SC Go ahead. 11 here.  
CAPCOM Rog. We switched antennas on  
you there moments ago, Neil. Will you please give us the  
LM CM Delta-P reading? Over.  
SC It's less than 21.  
CAPCOM Roger.

END OF TAPE

APOLLO 11 MISSION COMENTARY, 7/18/69, GET 59:51 CDT 20:22 195/1

SC 21 5 now Neil says, Charlie.  
CAPCOM Roger, thank you Mike, could you give us some help? This PTC is strange, it's not like anything we've seen before. We were wondering if you'all have had any events of any odd data that could help us out, over.  
SC I didn't understand that. Say again.  
CAPCOM Roger, we're looking at a, sortof a funny looking PTC. We've already drifted out to 70 degrees in pitch and we're wondering if youall had any vents or any such thing as that, that could have caused us to pick up these rates to drive us off, over.  
SC Negative, Charlie. We don't know of anything.  
CAPCOM Roger.  
SC Unless it's got something to do with that entry from the position that we want to be in. I don't know.  
CAPCOM Roger, when we started off it looked real fine to us, now it's drifting off with a funny pattern that we haven't seen previously on a flight, and we're just trying to figure out, I think we'll probably start it over again. We'll be with you momentarily, over.  
SC Okay.  
CAPCOM Apollo 11 Houston. We hate to say it, but we'd like to terminate this PTC and start over again. We have no assurance that we're going to get it through the sleep period. With this funny configuration, or funny pattern. We'd like you to stop it now and go back to pitch 090 yaw 0 and roll, whatever you stop on, over.  
SC Roger.  
PAO This is Apollo Control at 59 hours 57 minutes. A few moments ago you heard Capcom Charlie Duke advise the crew to terminate the passive thermal control mode that they are presently in and reestablish the three revolution per hour roll rate about the spacecraft longitudinal axis that is used for thermal control. We had noticed a unexplained deviation from the attitude that the spacecraft was set up in. In this roll mode ideally it would roll about the longitudinal axis with very little wobble and if wobble is introduced for one reason or another, the reaction control system jets would come on as soon as the motion out of the prescribed plane had occurred and gone beyond prescribed limits, in this case 30 degrees to correct. The jet firings on past missions do tend to disturb the crews sleep. Rather than have the reaction control system jets come on during the night and perhaps have to awaken the crew to reestablish the passive thermal control at that time we elected to correct it now.

APOLLO 11 MISSION COMMENTARY, 7/18/69, GET 59:51, CDT 20:22, 195/2

CAPCOM You disabled Bravo and Charlie select quads ALPHA and DELTA, over.  
CAPCOM Apollo 11, Houston, over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-18-69 CDT 20:32 GET 60:01 196/1

PAO This is Apollo Control. We're getting quite a bit of noise on the air to ground circuit at this time as the spacecraft rotates from one OMNI antenna around to the next and we momentarily lose lock-on. At this time, Apollo 11 is 183,544 nautical miles from earth and the velocity, holding fairly constant now, at about 3042 feet per second. It's been moving down towards 3000 feet per second and seems to be leveling off somewhat.

PAO This is Apollo Control. We're going to take the air to ground circuit down temporarily until a stronger antenna lock is - . Here's a call to the crew. We'll stand by for that.

PAO This is Apollo Control. We will take down the air to ground circuit down at this time until we reestablish sufficient signal strength to eliminate the noise on the circuit.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/18/69 CDT 20:41 GET 60:10 197/1

PAO This is Apollo Control at 60 hours, 10 minutes. We've reestablished good antenna lock-on this time, and we'll continue to monitor for any conversation from the spacecraft. The crew is presently reestablishing the passive thermal control rotation rate of 3 revolutions per hour. Following that we expect they will begin their rest period. At the present time Apollo 11 is 183 821 nautical miles from Earth at a velocity 3037 feet per second.

CAPCOM Hello, Apollo 11. Hello, Apollo 11. Over.

SC Hello, Houston. You call us?

CAPCOM Roger. Reading you about 1 by. Looks like we picked a super attitude here for PTC stabilization. We're reading you in backup voice now. Over.

SC You're reading me loud and clear?

CAPCOM Roger.

SC Should I go back another one, Charlie?

CAPCOM I think we've got about the best configuration. We've been doing it off the ground here, 11. We'll just keep it as it is. Over.

SC Roger.

CAPCOM Apollo 11, Houston. Would you select COMMAND RESET and OMNI ALPHA? Over.

SC Houston, 11. We're in OMNI ALPHA.

CAPCOM Roger: We read you about 3 by now. Over.

SC Roger.

CAPCOM Apollo 11, Houston. We is stable. You can start the PTC. Over.

SC Roll left, don't you?

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-18-69 CDT 20:51 GET 60:20 198/1

SC Houston, Apollo 11. Check this page S-9-7; I've completed step 8 and I'd like to know what you think is ideal timing between step 8 and step 9 and step 10 on that page? Over.

CAPCOM Roger. Stand by.

CAPCOM Apollo 11, Houston. We don't see any time constraint. We'd like you to go ahead and set up the wide deadband and then go through step 10 and 11. Over.

SC Okay. Will do. I don't see any constraint here, Charlie. I was just checking to make sure because last time, I went from 8 to 9 to 10 to 11 a little bit more swiftly than I'd been doing in the past.

CAPCOM Roger.

SC Step 11 complete.

CAPCOM Roger. We copy.

CAPCOM Apollo 11, Houston. Would you please select OMNI BRAVO. Over.

SC Roger. BRAVO.

SC Houston, Apollo 11. How do you read on BRAVO.

CAPCOM Roger. Reading you 5 by.

SC Same here.

CAPCOM Apollo 11, Houston. Looks like we've got a good PTC going. It's good night from the white team. Over.

SC Okay. See you tomorrow. Thank you for everything.

END OF TAPE



APOLLO 11 MISSION CONTROL, 7/18/69, GET 60:47, CDT 21:09, 200/1

PAO This is Apollo Control at 60 hours 47 minutes. We just got a call from the spacecraft requesting that we give them the position of the S-IVB in respect to the spacecraft and we're currently coming up with that bit of information, so we'll stand by.

SC Houston, Apollo 11.

CAPCOM Go ahead, 11, over.

SC Do you have any idea where the S-IVB is with respect to us?

CAPCOM Stand by.

CAPCOM Apollo 11, Houston, the S-IVB is about 6 thousand nautical miles from you now, over.

SC Okay, thank you.

SC Houston, Apollo 11, how is the PTC?

CAPCOM Stand by.

CAPCOM 11, Houston. The PTC looks great to us, over.

SC Hey do you have any idea what happened to the previous one?

CAPCOM We have absolutely no idea, over.

SC Okay. Did it look like it was all right and just all of a sudden start diverting?

CAPCOM Negative, if you look at the plot which we'll save for you and let you see it post flight. It started off immediately on the first rev and just spiraled out to about oh, 20 to 20 degrees in pitch, and then it seemed to be setting up a spiral around an off set pitch point of about 20 degrees off from 90 degrees, but we didn't want to take a chance that it would become stable at that point. We thought it might diverge so we told you and started over again, over.

SC Okay, no complaints. I was just curious as to what had happened,

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, CDT 21:19 GET 60:57:00 201/1

No comments on this tape.

END OF TAPE

PAO This is Apollo Control at 61 hours, 39 minutes. We've had no further conversation with the crew since our last report. Flight Surgeon says there is no indication at this time that they have begun to sleep, but we expect they'll be getting to sleep here shortly. Coming up in less than 10 seconds now, we'll be crossing into the sphere of influence of the moon. A computational changeover will be made here in Mission Control. At this point as the moon's gravitational force becomes the dominant effect on the spacecraft trajectory, and our displays will shift from Earth reference to moon reference. At that point, which occurred a few seconds ago, the spacecraft was at a distance of 186 437 nautical miles from Earth, and 33 822 nautical miles from the moon. The velocity with respect to the Earth was 2990 feet per second, and with respect to the moon, about 3272 feet per second. The passive thermal control mode that was set up for the second time by the crew appears to be holding well at this point, and all spacecraft systems are functioning normally. Mission going very smoothly. At 61 hours, 41 minutes, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control at 62 hours 29 minutes. The flight surgeon reports that the crew appears to have been asleep now for about the past 30 minutes. The spacecraft appears to be holding its passive thermal control attitude very well and at this time Apollo 11 is about 32,000 miles from the Moon traveling at a speed of 3,782 feet per second. In the past 50 minutes or so, we have seen that velocity increase about 10 feet per second going from 3772 feet per second to the present 3782 as the spacecraft continues to accelerate toward the Moon. The Change of Shift Briefing following this shift will occur at about 11:15 PM Central Daylight Time. Flight Director Glynn Lunney and his team of flight controllers are coming on now being debriefed by the Eugene Kranz team and that shift change will be occurring shortly here. The new capsule communicator will be astronaut Ron Evans. At 62 hours 30 minutes, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 63:29 CDT 12:01 204/1

PAO This is Apollo Control. 63 hours 29 minutes ground elapse time. Some 5 1/2 hours remaining in the Apollo 11 crew scheduled rest period. Crew apparently soundly asleep at this time. Spacecraft now 29,715 nautical miles out from the moon. Velocity now 3,796 feet per second. Black team flight director Glynn Lunney going around the room discussing with the various flight control positions the situation for the sleep shift. Talking now to flight dynamics officer on the pros and cons of doing or not doing mid course correction burn number 4. And at 63 hours 30 minutes ground elapse time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 1:00 GET 64:28:00 205/1

PAO This is Apollo control 64 hours, 28 minutes ground elapsed time. Some 4 1/2 hours remaining now in the scheduled Apollo 11 crew sleep period. However, since there is little likelihood that midcourse correction burn number 4 will be done, since it's a very small magnitude maneuver, that the crew will be allowed to sleep another couple of hours. At this time, Apollo 11 is some 27,529 nautical miles out from the moon traveling at a velocity of 3,812 feet per second. The black team of flight controllers has settled in for the night. Everything running quiet here in the control room. We're anticipating a playback of yesterday afternoon's TV transmission from Apollo 11 which lasted some hour and a half in which the camera was taken into the lunar module at the end of it's cable. This will be played back for the flight controllers who, at that time, were - most of them were asleep. At 64 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 2:00 GET 65:28 206/1

PAO This is Apollo Control, 65 hours, 28 minutes ground elapsed time. 3 1/2 hours remaining in the scheduled sleep period for the crew of Apollo 11, however this will likely run into more like 5 1/2 hours remaining. Countdown clock for lunar landing now showing 37 hours, 18 minutes. Apollo 11 now 25 280 nautical miles out from the moon traveling in a velocity of 3832 feet per second. In terms of distance. Stand by, we thought we had some Earth reference numbers, but apparently that display is not up at this time. Present weight of the spacecraft 96 029 pounds. Presently being tracked by the tracking station at Honeysuckle Creek, Australia. And at 65 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 3:00 GET 66:29 207/1

PAO This is Apollo Control, 66 hours 29 minutes Ground Elapsed Time. Apollo 11 presently 22 952 nautical miles out from the moon, and traveling at a velocity of 3858 feet per second. 2 hours 29 minutes remaining in the sleep period. However, as mentioned earlier, this likely will run another 2 hours. Clock counting down to lunar landing, showing 36 hours 16 minutes. Still tracking through the Honeysuckle Creek, Australia tracking station, and all is rather quiet here in the Control Center during the sleep watch. At 66 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 67:28, CDT 4:00 208/1

PAO This is Apollo Control 67 hours, 28 minutes ground elapsed time. Midcourse correction burn number 4 has been deleted from the Flight Plan on the recommendation to Flight Director Glynn Lunney from the Flight Dynamics Officer, Jay Green. The maneuver, had it been carried out as planned, would be in the neighborhood of one-half foot per second velocity change. As it is now, the trajectory is being predicted to arrive at near point or closest approach of about 62 nautical miles plus or minus two miles if nothing else is done to the trajectory. That is if no maneuver is made. The spacecraft cabin pressure now holding at 4.7 pounds per square inch. Temperature 60 degrees F. The planned sleep period has another hour and one-half to go but as mentioned earlier it will likely run another couple hours in as much as mid-course correction burn number 4 will not be made and the crew will not have to spend the time preparing to do the burn, align the platform and do all the chores necessary for doing a maneuver of this sort. Clock counting down to lunar landing showing 35 hours, 17 minutes. And at 67 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 5:00 GET 68:29:00 209/1

PAO This is Apollo control 68 hours, 28 minutes ground elapsed time. Some 2 hours and 31 minutes remaining crew sleep period according to the revised schedule inasmuch as midcourse correction burn number 4 has been omitted. Still being tracked - Apollo 11 is still being tracked by the Honeysuckle Creek, Australia station. And, here in mission yesterday's hour and a half long television pass as the crew manned the LM for the first time in checkout is being replayed. This will be piped across to the news center for anyone who might want to view it again. At 68 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 5:58 GET 69:18 210/1

CAPCOM Apollo 11, Houston. Good morning.  
SC Good morning. Are you planning a course correction for us this morning?  
CAPCOM That's negative. Mid course number 4 is not required. We were going to let you sleep in until about 71 hours, if you'd like to turn over.  
SC Okay, (garble).  
CAPCOM Say again, Buz. You were cut off here.  
SC Okay, I'll see you at 71 hours.  
CAPCOM Roger.  
PAO This is Apollo Control. So much for that. Looks like they'd rather turn over and go back to sleep. At 69 hours, 19 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 7:00 GET 70:30 211/1

PAO Planned wake-up time for the crew is 71 hours elapsed. Cliff Charlesworth and the Green team of flight controllers has just relieved Glynn Lenney's Black team. CAPCOM now is Bruce McCandless. Apollo 11 is 13 638 nautical miles from the moon. Velocity, 4047 feet per second, lunar reference.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 7:32, GET 71:00, 212/1

PAO This is Apollo Control, at 71 hours into the mission. Apollo 11 is 12 486 nautical miles from the Moon. Approaching at a velocity of 4,087 feet per second. We will stand by here and see whether we put in a call to the crew.

PAO We're putting a call into the crew now.  
CAPCOM Apollo 11, Apollo 11, this is Houston, over.

SC Good morning, again, Houston, over.  
CAPCOM Roger, 11, good morning. When you -  
SC Would you like the attitude purge this morning?

CAPCOM Yes, indeed. O2 fuel cell purge at 71 hours, and when you feel like copying I've got a flight plan update containing, I guess that, and some other items for you.

SC Purge is first.  
SC Houston, Apollo 11, go ahead with flight plan update.

CAPCOM Roger, 11, this is Houston. At approximately 71 hours to 72 hours, we have you down for an eat period which I imagine is probably in progress already. 71 hours O2 fuel cell purge, 72 hours, GET, CO2 filter change number 6, secondary radiator flow check, and we'll send you up at P37 block data on a 2 hour pass, pericycnthion pass return mode abort. At 73 hours 00 minutes stop PTC at approximately 0 degrees roll, that is when you're coming up on 0 degrees roll angle around 73 hours we'd like you to stop PTC. And perform a P52 option 3 remaining in the PTC REFSMMAT for a drift check. 73 hours 20 minutes, we'll give you a P27 update to the landing site REFSMMAT, LOI 1 state vector and target load. 73 hours 30 minutes maneuver to 000 roll, pitch, and yaw. High gain antenna angles will be pitch 0, yaw 335, and perform a P52 option 1 using the new landing site REFSMMAT. Resume the nominal flight plan at 74 hours GET, over.

SC Okay, we'll get started on fuel cell purge while we're eating. CO2 canister change number 6, secondary radiator purge check, (garbled) also at 72 hours, stop PTC 0 roll at 73, do a P52 option 3, we'll get your uplink REFSMMAT for the landing site, and at 000 - let's see, now was this with the old REFSMMAT or the new REFSMMAT?

CAPCOM This is with the -  
SC And antenna -  
CAPCOM This is with the new REFSMMAT, Buzz.  
SC You said you want a P52 (garbled)

attitude to REFSMMAT?

CAPCOM Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 7:42, GET 71:10, 213/1

CAPCOM Apollo 11, this is Houston. Over.  
SC Houston, go ahead.  
CAPCOM Roger, 11. Correction on my last -  
at 7320, we uplinked you the new refsmat, and at 7330, we'd  
like you to maneuver to 0 ROLL, 0 PITCH, 0 YAW in the old  
refsmat, and then torque around to the new refsmat and run  
your P-52 option 1 in that same inertia attitude. Over.  
SC Roger, understand.  
CAPCOM I've got a consumables update when  
you're ready to copy.  
SC I just got up but you didn't catch me  
on that one.  
CAPCOM I said I have one for you.  
SC Okay, we're ready to copy that consum-  
ables update.  
capcom Roger. As of GET 6800, RCS totals  
minus 4.5 percent corresponding to approximately minus 53  
pounds. ALPHA minus 6.0 percent, minus 1.0 percent, minus 7.0  
percent, minus 3.0 percent. H2 total minus 1.2 pounds. O2 total .  
plus 10 pounds. Over.  
SC Roger, and our readouts onboard are  
ALPHA 82, BRAVO is 84, COCO is 84, and DELTA is 87.  
CAPCOM Houston, Roger out.  
SC And you want us to cycle the O2 and  
H2 fans I imagine, huh?  
CAPCOM 11, this is Houston. Affirmative. Over.  
SC Okay.

END OF TAPE

SC Houston, Apollo 11. I have  
a status report for you.  
CAPCOM Go ahead, 11.  
SC Roger. On sleep, CDR, CMP 7.5,  
LMP 6.5. Over.  
CAPCOM Roger. 7.5 for each. Over.  
SC Negative. LMP 6.5.  
CAPCOM Roger. 7.5, 7.5 and 6.5, and  
I got a few words for you here on the SPS engine performance.  
Over.

SC Okay, we're ready to look.  
CAPCOM Okay, 11. It turns out that  
the engine performance during both of your burns so far this  
mission has been the same as it was on engine acceptance  
tests. The onboard PC reading is due to a known gage  
calibration factor between what you actually got in the  
chamber and what you're reading out on the gage. We expect  
single bank operation to be 90 - that is 90 psi on the gage  
with an actual chamber pressure of 95 psi. In dual bank  
operation the chamber pressure is 94 psi on the gage with an  
actual of 99 psi. 80 psi on the gage onboard correlates to  
83 psi actual, and we recommend that you stick to LOI termina-  
tion cue of 80 psi on the gage - that is no change to the  
mission rules. Over.

SC Apollo 11, roger. We got all  
that.

CAPCOM Houston, out.  
PAO This is Apollo Control at 71 hours,  
31 minutes. Apollo 11's distance from the moon now 11,232 nautical  
miles approaching at a velocity of 4,141 feet per second.

SC Houston, Apollo 11. Houston.  
CAPCOM Apollo 11, this is Houston. Go  
ahead. Over. Apollo 11, this is Houston. Go ahead. Over.  
Apollo 11, this is Houston. Go ahead. Over.

SC Houston, you read Apollo 11?  
CAPCOM Roger, 11. We're reading you loud  
and clear now. We were down in the noise as we switched antennas  
an hour or so ago. Over.

SC Roger. What sort of (garbled)  
could you recommend for the solar corona? We've got the sun  
right behind the edge of the moon now.

END OF TAPE

SC Roger. What sort of (garbled) could you recommend for that solar corona. We've got the sun right behind the edge of the moon now.

SC Roger. It's quite an erie sight. There is a very marked three-dimensional aspect of (garbled) corona coming from behind the moon glares.

CAPCOM Roger.

SC And it looks as though - I guess what gives it that three-dimensional effect is the earth shine. I can see Tycho fairly clearly - at least if I right that up, I believe it's Tycho in moonshine, I mean in earthshine. And, of course, I can see the sky is lit all the way around the moon. Even on the limb of it where there's no earthshine or sunshine.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger. If you'd like to take some pictures, we recommend you using magazine uniform which is loaded with high speed black-and-white film. Interior lights off. Electric hasselblads with the 80 millimeter lens, and you're going to have to hand hold this, I guess. We're recommending an F stop of 2.8, and we'd like to get a sequence of time exposures. Over.

SC Okay. You want the magazine uniform instead of magazine tangle. Over.

CAPCOM Roger. We're not trying to get you all wrapped up in a procedure here. This is on a not-to-interfere basis, of course. Over.

SC Okay.

CAPCOM And on the exposures, we're looking for an eighth of a second, a half a second, and if you think you can steady the camera against anything to get longer exposures, 2 seconds, 4 seconds, and 8 seconds. Over.

SC Roger. Copy.

CAPCOM Roger. Out.

CAPCOM Apollo 11, Houston. Over.

SC Go ahead, Houston.

CAPCOM Roger. We'd like to do a little cryo tank balancing, so if you could position the oxygen tank number 1 heater switch OFF and hydrogen tank 2 heater switch to OFF leaving all the rest of the cyro switches the same, we'll let it run that way for a few hours. Over.

SC Okay. Stand by one on those switches. We'll get it in a minute.

CAPCOM Roger. How far out can you see the corona extending? Over.

SC How much - a little bit like the (garbled) light? It keeps going out farther and farther. We'll talk about it a little more later.

APOLLO 11 MISSION COMMENTARY, 7-19-69, GET 17:34, CDT 8:06 215/2

CAPCOM Roger, out.  
SC (garbled) We've got quite a  
few pictures (garbled) mission (garbled)  
CAPCOM Apollo 11, this is Houston. I  
think we have comm again. We heard you calling. Over.  
CAPCOM Apollo 11, this is Houston. Were you  
calling? Over.  
SC Houston, Apollo 11. Understand  
you want the heaters off for hydrogen tank 1 and oxygen tank 1.  
Is that affirmative?  
CAPCOM That's negative, Mike. Hydrogen  
tank number 2 heaters off and oxygen tank number 1 heaters off.  
SC Okay.  
CAPCOM Roger, out.  
SC We have hydrogen tank number 2  
heaters off. I have oxygen tank number 1 heaters off.  
CAPCOM Roger, out.  
SC Houston, Apollo 11. The earth-  
shine coming through the window is so bright you can read  
a book by it.  
CAPCOM Oh, very good.  
PAO That was Mike Collins reporting.  
SC And Houston. I suggest that  
along the ecliptic line we can see - throwing the light out  
to 2 lunar diameters from this location. The bright light  
only extends out about - about an eighth to a quarter of the  
lunar radius.  
CAPCOM Roger. Understand that you  
can see the corona approximately 200 solar diameters out along  
the ecliptic, and the bright light extends out approximately  
1/8 to 1 quarter lunar radius. Over.  
SC That's 2 lunar - 2 lunar diameters  
along the ecliptic in the bright part, right, a quarter to an eighth of a  
lunar radius out, and that's perpendicular to the ecliptic  
line on the south pole.  
CAPCOM Roger.  
PAO That last transmission was from  
Neil Armstrong.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 8:31, GET 71:59 216/1

SC Houston, it's been a real change for us. Now we are able to see stars again and recognize constellations for the first time on the trip. The sky is full of stars, just like the nights out on earth. But all the way here, we have just been able to see stars occasionally and perhaps through the monoculars, but not recognize any star pattern.

CAPCOM I guess it has turned into night up there early, hasn't it?

SC Really has.

PAO This is Apollo Control at 72 hours, 7 minutes. Apollo 11 is 9761 nautical miles from the moon, velocity 4217 feet per second. Weight 9612 pounds.

CAPCOM Apollo 11, this is Houston. How do you read? Over.

SC Okay. We went to high gain. Looks like you had a little trouble getting signal strength there.

CAPCOM Roger. We missed the OMNI switch there. Over.

SC All right. On the secondary loop check when we went to flow on secondary radiators, the quantity dropped from 40 percent down to 36 in the first 10 seconds and then stabilized at 36 for the remainder of the 30 seconds.

CAPCOM Apollo 11, this is Houston. We believe that is the normal system of operation. The radiators are expected to be very cold right now and apparently the decrease is always due to contraction in the fluid. Over.

SC Okay. We will go ahead with the procedure just as though there were no decrease in accumulated quantity. Right?

CAPCOM Roger. Press on.

SC Houston, the secondary radiator flow check is complete and satisfactory.

CAPCOM Houston. Roger. Out.

SC And that is a good deal because we don't have to have any meetings about whether we are going to do it or don't do it anymore.

CAPCOM That's for sure.

PAO That was a Mike Collins comment.

CAPCOM Flight Director says, "Ouch".

SC No ouch intended. I enjoyed every one of those meetings.

CAPCOM 11, this is Houston. I have your pericyntian forced tube pad, P-34, when you are ready to copy.

SC Houston, Apollo 11, ready to copy  
pericynthion plus 2.  
CAPCOM Apollo 11, this is Houston. Pericynthion  
plus 2 hours pad. SPS G&N 62710 plus 098 minus 019, GET  
ignition 077462248, DELTA VX 981 plus 32148 minus 00455  
minus 10377 ROLL NA, PITCH 307 and the remainder of the  
pad is NA. GDC align stars Vega and Deneb, ROLL 243183012  
no ullage; remarks, assumes landing site REFSMMAT and docked.  
Over.

SC Roger. SPS G&N 62710 plus 098 minus  
019 077462248 plus 32148 minus 00455 minus 10377, NA 307,  
Vega and Deneb 243183012 no ullage, landing site REFSMMAT,  
docked, and do you have any change in LM weight? Over.

CAPCOM No change in LM weight and readback is  
correct. Out.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger. Go ahead.

CAPCOM Roger. We are having difficulty getting  
commands into the spacecraft. We would like for you to  
cycle your up telemetry switch to command reset and off and  
back to normal. Over.

SC Okay. We'll do it.

SC We have you on high gainer now. Do  
you want us to switch over to OMNI?

CAPCOM Negative. We'd like to stay on high  
gain, if we can. Over.

SC Okay.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger. We'd like you to switch to  
OMNI Delta as we show you approximate at the scan limit of  
the high gain antenna. We will then command OMNI DELTA  
down here after you advise us of you've switched, and then you  
can select BRAVO on board and we'll be back in the OMNI  
antenna commanding business. Over.

SC Okay. We are going to DELTA now.

CAPCOM 11, Houston. You can go ahead and  
select OMNI BRAVO on board now.

SC Roger.

capcom Roger. Out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 9:01, GET 72:29, 217/1

CAPCOM Apollo 11, this is Houston. If you have a minute or so free, we can read you up the morning news here.

SC Go right, ahead, let's hear it.

CAPCOM Roger, hot from the wires of the MSC Public Affairs Office especially prepared for the crew of Apollo 11.

CAPCOM First off, it looks like it's going to be impossible to get away from the fact that you guys are dominating all the news back here on Earth. Even Pravda in Russia is headlining the mission and calls Neil, "The Czar of the Ship." I think maybe they got the wrong mission. West Germany has declared Monday to be "Apollo Day." School children in Bavaria have been given the day off. Post Office clerks have been encouraged to bring radios to work and Frankfurt is installing TV sets in public places. BBC in London is considering a special radio alarm system to call people to their TV sets in case there is a change in the EVA time on the moon. And in Italy, Pope Paul VI has arranged for a special color TV circuit at his summer residence in order to watch you, even though Italian television is still black and white. Back here in Houston, your three wives and children got together for lunch yesterday at Buzz's house. And according to Pat it turned out to be a gabfest. The children swam and did some high jumping over at Buzz's bamboo pole. In Moscow, space engineer Anatoly Koritsky, was quoted by Tass as saying that Luna 15 could accomplish everything that has been done by earlier Luna spacecraft. This was taken by the press to mean Luna 15 could investigate the gravitational fields, photograph the moon and go down to the surface to scoop up a bit for analysis. Even the kids at camp got into the news when Mike, Jr. was quoted as replying "yeah" when somebody asked him if his daddy was going to be in history - then after a short pause he asked, "What is history?" In Washington, President Nixon is planning to use his executive power to streamline the Interstate Commerce Commission. According to industry sources, it was reported Nixon would trim the commission from 11 to 7 members by not making new appointments. And the big news around Houston today concerns the Astros. In the Sports World the Houston Astros rallied in the 9th inning at Cincinnati to dump the Reds 7 to 4. Going into the 9th however, things looked pretty bleak. The Astros were trailing 4 to 3. Then with one out Jesus Alou stroked a single to the right field. John Edwards hit another single to the right, Sandy Valdespino hit a double to bring in the tying run. Julio Gotay was walked and Joe Morgan dropped a bunt for the game winning play. A wild throw to the plate allowed another run to score. Then a sacrifice fly by Denis Menke brought in the final run. They really came through in the 9th. And other games in the National League.

SC Yeah, those Astros have really been catching those flys since they put a roof on the stadium.

CAPCOM Good work. In other games in the National League, New York beat Montreal 5 to 2; Pittsburgh beat St. Louis 4 to 1; and Atlanta over San Diego in the first game of a double header 6 to 2. In the American League, Detroit beat Cleveland 4 to nothing; New York trounced Washington 5 to nothing; Baltimore out hit - Boston out hit Baltimore to score 6 runs to the Orioles' 2; and Chicago beat Kansas City 6 to 1. Okay, in golf world, Tommy Jacobs, infrequent competitor in recent years took the lead in the Philadelphia Golf Classic yesterday. His second round score was 139. You might be interested in knowing, since you are already on the way, that a Houston astrologer, Ruby Graham says that all the signs are right for your trip to the moon. She says that Neil is clever, Mike has good judgement, and Buzz can work out intricate problems. She also says Neil tends to see the world through rose colored glasses, but he is always ready to help the afflicted or distressed. Neil, you are also supposed to have quote, "intuition that enables you to interpret life with feeling," unquote. Buzz is to be very sociable and cannot bear to be alone in addition to having excellent critical ability. Since she didn't know what hour Mike was born, she has decided that he either has the same attributes as Neil or he is inventive with an unconventional attitude that might seem eccentric to the unimaginative. And last but not -

SC Who said all that? (laughter)

CAPCOM Ruby Graham, an astrologer here in Houston. Now that we've got a check with Flight Operations for all the signs of the mission, and then we, of course, had to make sure that everything was really all set.

SC Houston, 11 (garbled).

CAPCOM Apollo 11, Apollo 11, this is Houston. We're switching OMNI, can you stand by for about 2 minutes.

SC Houston, 11, radio check.

CAPCOM 11, Houston, go ahead.

SC Roger, you cut out after Tommy Jacobs. I guess we got into antenna switching problems.

CAPCOM Okay, following Tommy Jacobs, we have a hot smoking word from a Houston astrologer by the name of Ruby Graham. She say that all the signs are right for your trip to the moon. Neil is clever, Mike has good judgement, and Buzz can work out intricate problems. She also says Neil tends to see the world through rose colored glasses, but he is always ready to help the afflicted and distressed. Neil, you are also supposed to have quote, "intuition that enables you to interpret life with feeling," unquote. Buzz is supposed to be very sociable and cannot bear to be alone in addition to having excellent critical ability. Since she didn't know at what hour Mike was born, she decided he either has the same attributes as Neil or he is inventive with an unconventional attitude that might seem eccentric to the unimaginative. And that's it for today, over.

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 9:01, GET 72:29 217/3

SC Thank you much there, Bruce and  
Fred, we appreciate that.  
CAPCOM Roger.  
PAO That was Fred Haise alternating with  
Bruce McCandles on the newscast.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69, CDT 9:11, GET 72:39, 218/1

SC Roger.  
PAO That was Fred Haise alternating with  
Bruce McCandles on that news cast.  
SC Did you hear our comment about the  
Astro's?  
CAPCOM The one about the roof?  
SC Yes.  
CAPCOM Hey Mike, the game was at Cincinnati  
there, and we think that they're still using Crosby Field  
up there. I don't believe it has a roof on it.  
SC You got him on that one.  
CAPCOM (garbled)  
SC It'd have to be a good team in clinch.  
CAPCOM I assume they seem to be.  
SC Well, if they can do that well without  
a roof, think of what they're going to do with a roof.  
CAPCOM Roger, out.  
SC We're trying.  
CAPCOM An old Oiler fan is trying to comment  
on an alien game.  
SC You tell Michael, Jr., history or no  
history, he better behave himself.  
CAPCOM Roger, we'll pass that along, Mike.  
PAO This is Apollo Control at 72 hours,  
45 minutes. Apollo 11 is now 8188 nautical miles from the  
moon approaching at a velocity of 4324 feet per second.  
CAPCOM Apollo 11, Houston. If it's convenient  
with you we have an LOI 1-pad that we can pass up to you  
now. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 9:21 GET 72:49 219/1

CAPCOM pass up to you now. Over.  
SC Stand by.  
SC Houston, Apollo 11. The next time we pass through roll 0, we're going to stop PTC and that will give us a 90 degree pitch. Now, I understand you want us to move from 90 degrees pitch to 0 degrees pitch for the platform align option 1, is that affirmative?  
CAPCOM Stand by, please.  
SC And we are ready to copy on the LOI 1.  
CAPCOM Apollo 11, this is Houston. when you stop at 0 roll you will be in approximately 90 pitch, 0 yaw and 0 roll. We'd like you to run the first P52, that is the P52 option 3, from that attitude. Then we'll uplink you a new REFSMMAT either before or while you are maneuvering to 000 and then you can torque the platform around and run the second REFSMMAT. Over. Run the second P52. Over.  
SC Okay.  
CAPCOM And I copy you are ready for the LOI 1 pad. Over.  
SC Go ahead.  
CAPCOM LOI 1, SPS G&N 62710 plus 098 minus 019 GET ignition 075 49 4965 minus 28897 minus 03944 minus 00686. Roll 358, Pitch 226 347 01692 plus 00610 29173 602 29108 Sextant star 31 1066 358. Remainder of the pad is NA. GET align Vega and Deneb 243 183 012. No ullage. The horizon will be visible just below the upper edge of the hatch window 2 minutes prior to the LOI burn. It will not be visible in the rendezvous window on the left hand side. LOS at 75 hours 41 minutes 23 seconds. AOS at 76:15:29. AOS without the LOI burn 76:05:30. The values which you will see on NOUN 42 prior to LOI burn are HA plus 431.3 HP minus 128.2. Read back. Over.  
SC Roger, LOI 1 SPS G&N 62710 plus 098 minus 019 075494965 minus 28897 minus 03944 minus 00686 358 226 347 01692 plus 00610 29173 602 29108 31 106.6 358 GET align Vega Deneb 243 183 012. No ullage. Horizon in the hatch window 2 minutes before. Pitch AOS with an LOI 76:15:29. AOS without an LOI 76:05:30. HA before the burn 431.3, HP minus 128.2, say again LOS time.  
CAPCOM Roger, LOS time 75:41:23. Over.  
SC Understand 74:41:23.  
CAPCOM 11, this is Houston. Readback correct. Out.  
PAO That was Neil Armstrong with the readback of the lunar orbit insertion burn number 1 pad. The ignition time for that burn 75 hours 49 minutes 49 seconds. That's 2 hours 57 minutes 49 seconds from this time. Duration ob that burn 6 minutes 2 seconds, retrograde and the change in velocity 2917.3 feet per second. The expected orbit

APOLLO 11 MISSION COMMENTARY, 7/19/69 CET 9:21 GET 72:49 219/2

PAO following that maneuver is 169.2 by 62 nautical miles. To repeat the LOS AOS times we will lose signal with Apollo 11 at 75 hours 41 minutes 23 seconds as it goes behind the Moon. Given a successful lunar orbit insertion number 1 burn we will acquire the signal at 76 hours 15 minutes 29 seconds. If for some reason Apollo 11 can not perform the burn we will acquire the spacecraft at 76 hours 5 minutes 30 seconds.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-19-69, GET 72:59, CDT 9:31 220/1

CAPCOM Apollo 11, this is Houston. Over.  
SC Go ahead.  
CAPCOM Roger. Apparently we missed getting your onboard readouts on battery Charlie and pyro batteries alpha and bravo last night. I wonder if you can give us some fresh summaries. Over.  
SC You want the readings for now?  
CAPCOM Yes, please. If it's convenient for you.  
SC Okay, all three of them are still on 37.1.  
CAPCOM Roger. 37.1 cubed. Out.  
PAO This is Apollo Control at 73 hours, 6 minutes. Apollo 11's distance from the moon now 7 331 nautical miles. Velocity is 4 399 feet per second. The ignition time passed up to the crew on this pad is 4 minutes, 39 seconds earlier than the LOI 1 time published in the flight plan prior to liftoff. This means that all lunar events will move forward from the published flight plan time by this amount of time - 4 minutes, 39 seconds. This time will be made up during the transearth coast, and splash should occur at the flight plan time. This is Mission Control, Houston.  
SC Houston, Apollo 11. The P52 oxygen 3 is complete. We're maneuvering to 000.  
CAPCOM Roger. We observe your maneuvering, and we'll have some uplinks for you in a couple of minutes here.  
SC Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 9:42, GET 73:10, 221/1

CAPCOM Apollo 11, this is Houston. We'll  
give you POO. If you'll give us ACCEPT, we'll start our uplinks.

SC You've got it Houston.

CAPCOM Roger, out.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM Roger. We're on low bit rate at the  
present time so it's going to take us a little bit longer  
than normal to get this stuff up to you. Over.

SC I guess we're in no rush.

CAPCOM Okay, we're here if you're there.

SC The view of the moon that we've been  
having recently is really spectacular. It fills about 3  
quarters of the hatch window, and of course, we can see the  
entire circumference even though part of it is in complete  
shadow and part of it's in earth-shine. It's a view worth  
the price of the trip.

CAPCOM Well, there's a lot of us down here  
that would be willing to come along.

PAO That was Neil Armstrong.

SC I hope you get your turn, and do.

SC One of these days, we'll be able to  
bring the whole MOCR along, I hope. Save a lot of  
antenna switching.

CAPCOM Say again, 11.

SC One of these days, we could bring the  
whole MOCR along, and then that'll save a lot of antenna  
switching.

CAPCOM That's jolly.

PAO The MOCR is the mission operations  
control room. That's the control center here.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, this is Houston. We're still -

SC The Czar is brushing his teeth, so I'm  
filling in for him.

CAPCOM Say again, please.

SC I said the Czar is brushing his teeth,  
and I'm filling in for him. What can we do for you?

CAPCOM Roger. If you don't get in the way of  
the Czar while he's brushing his teeth, we'd like you to bring  
up the primary accumulator quantity a little bit. We're  
showing the quantity now at 20.6 percent on TM. Seems to  
have gone down a bit since you've gone into the shadow. We'd  
like it serviced to bring the quantity up to between 30 and 40  
percent, preferably 35 percent. Over.

SC Okay.

CAPCOM The computer is your's 11. The loads  
are in verified. You can go back to BLOCK.

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 9:42, GET 73:10, 221/2

SC We're in BLOCK.  
CAPCOM 11, this is Houston. On the basis of your last P-52 alignment, the platform looks like it's indeed performing very well. No problems there. No updates required, and no PIPA bias update is required either. Over.  
SC How good.  
PAO This is Apollo Control at 73 hours, 25 minutes. Apollo 11 is 6522 nautical miles away from the moon approaching at a velocity of 4483 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 9:58, GET 73:26 222/1

SC Houston, Apollo 11. Are you there?  
CAPCOM 11, this is Houston. Loud and clear. Over.  
SC Okay. Just checking. Do you want high gain?

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 10:13 GET 73:41 223/1

SC Okay, just a second. Do you want it high gain?  
CAPCOM Roger, if you can give it to us.  
SC Okay.  
SC Houston, Apollo 11. How do you read on that high gain?  
CAPCOM Loud and clear on the high gain.  
SC Same here. We've completed the P52 option 1.  
CAPCOM Roger, we've been looking over your shoulder on TM.  
SC Glad to have you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 10:27, GET: 73:55, 224/1

SC Houston, Apollo 11. Standing by to copy TEI 1 and TEI 4, over.

CAPCOM Roger, I got the 1 and 4 pads here, right now. I'll be ready to read them up to you in just a second.

CAPCOM 11, this is Houston. I'm ready with the TEI 1, 4 pads, over.

SC Ready to copy.

CAPCOM Roger, TEI 1, SPS G&N 38 658 minus 054 plus 065, TIG 078 02 0345 plus 29'er 180 plus 03 779'er minus 01 325 roll NA pitch 041. The balance of the pad is NA. Ullage 2 jets, 19 seconds. TEI 4 pad, SPS G&N 38 658 minus 054 plus 065, TIG 084 29'er 50 59'er, plus 31 373 plus 03 760 minus 00 968 roll NA pitch 034. The rest of the pad is NA, ullage 2 jets, 19'er seconds. Both of these pads are for an undock maneuver. TEI plus 4 pad assumes no LOI 2, over. Make that TEI 4 pad assumes no LOI 2.

SC Roger, TEI 1, SPS G&N 38 658 minus 054 plus 065, 078 02 0345 plus 29'er 180 plus 03 779'er minus 01 325 roll NA pitch 041, 2 jets 19 seconds undock. TEI 4 38 658 minus 054 plus 065 084 29'er 5059'er, plus 31 373 plus 03 760 minus 00 9'er 68 roll NA pitch 034, 2 jet 19 seconds undocked, assumes no LOI 2.

CAPCOM 11, this is Houston.

SC Apollo 11, over.

CAPCOM 11, this is Houston. Read back correct, out.

PAO That was Buzz Aldrin with the read back of that information which was for contingency transearth injection burns if required shortly after lunar orbit insertion.

CAPCOM 11, this is Houston, over.

SC Roger, go ahead, Houston.

CAPCOM Roger, at GET of 74 30, we'd like you to cycle the fans in all 4 cyro tanks, and position the heaters in all 4 cyro tanks to the AUTO position. We're doing this in advance of LOI in order to insure that you don't have any destratification as a result of the burn which might result in giving you a MASTER CAUTION warning during the burn, over.

SC Okay, was that 74 30 you wanted us to cycle the heaters and turn - cycle the fans and turn all the heaters on.

CAPCOM All heaters to AUTO: cycle the fans at 74 30 about 25 minutes from now, over.

SC Okay.

PAO This is Apollo Control at 74 hours 8 minutes. Apollo 11 is 4,625 nautical miles away from the moon. Velocity 4,765 feet per second. We're 1 hour 32 minutes away from loss of signal as Apollo 11 goes behind the moon, and we're about 1 hour 41 minutes away from the LOI number 1 burn.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 10:53, GET 74:21, 225/1

PAO This is Apollo Control at 74 hours,  
32 minutes. Apollo 11 is traveling at a velocity of 3- stand  
by. We've got a static display here.

CAPCOM 11, this is Houston. Radio check. Over.  
SC Houston, reading you loud and clear.  
CAPCOM Roger, loud and clear now.  
SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Apparently this is not a very good OMNI  
attitude for you. We're ready to start our PTC check.

CAPCOM 11, this is Houston. We're ready  
except that we'd like to get the high gain antenna prior to  
this test. Over.  
SC Can you give us a pointing angles?  
CAPCOM Roger. From an attitude with 60 degrees  
ROLL around to an attitude of ROLL 058 inertial. It would  
be PITCH plus 30 and YAW 270 on the high gain antenna.  
SC Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-19-69, GET 74:41, CDT 11:13 226/1

CAPCOM Apollo 11, Apollo 11, this is  
Houston. Radio check. Over. Apollo 11, Apollo 11, this is  
Houston. Radio check. Over. Apollo 11, this is Houston.  
Do you read? Over.  
SC Roger. (garbled)  
CAPCOM Roger. We're reading you weak  
but clear.  
SC Roger. We put our - our roll  
for MSFN track in on the wrong side. Got to get this new  
roll around until we get high gain here, and we'll delete  
the - the pitch that was scheduled after the PTC check.  
CAPCOM Say again, please, 11.  
SC Roger. We put the wrong sign in -  
CAPCOM Roger.  
SC for the roll correction to get  
MSFN high gain, and we're continuing rolling her around  
to get the proper attitude for high gain at this time. We  
will delete the pitch maneuver that was scheduled subsequent  
to - subsequent to the TV check since we already have those  
pictures.  
CAPCOM Roger. We copy, and - and we  
recommend that you go ahead and complete your TVC test onboard.  
If you have problems we'll talk to you when you get around  
to the further high gain antenna attitude. Over.  
SC Roger.  
SC Houston, how are you reading on  
high gain?  
CAPCOM Oh, loud and clear on high  
gain, 11.  
SC Roger. We're proceeding.  
CAPCOM Roger.  
PAO This is Apollo Control at 75 hours  
into the mission. Apollo 11 is 2 241 nautical miles away  
from the moon. Velocity 5 512 feet per second. We're 41 min-  
utes away from loss of signal as 11 goes behind the moon.  
We're 49 minutes away from the lunar orbit insertion maneuver  
number 1.  
CAPCOM Apollo 11, this is Houston. We  
observed your gimbal test down here, and it looked good to  
us. Over.  
SC Thank you, it looked good here.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 11:38, GET 75:06 227/1

PAO This is Apollo Control at 75 hours,  
15 minutes into the mission. Apollo 11's distance from  
the moon now is 1516 nautical miles. Velocity 5981 feet  
per second.

CAPCOM Apollo 11, this is Houston. Radio  
check. Over..

SC Go ahead.

CAPCOM Roger. And your systems are looking  
good from down here.

SC Looks good up here too, Bruce.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 11:58 GET 75:26 228/1

PAO This is Apollo Control at 75 hours  
26 minutes. We're 15 minutes away from loss of signal.  
Apollo 11 is 9066 miles from the Moon, velocity 6511 feet  
per second. We're 23 minutes away from the LOI burn.

PAO Flight Director Cliff Charlesworth polling  
flight controllers for the GO/NO-GO status for LOI now.

CAPCOM Apollo 11, this is Houston. Over.  
SC Roger, go ahead Houston, Apollo 11.  
CAPCOM 11, this is Houston. You are GO for LOI.  
Over.

SC Roger, GO for LOI.  
CAPCOM And we're showing about 10 minutes and  
30 seconds to LOS. I would like to remind you to enable the  
BD roll on the auto RCS switches. Over.

SC Roger, and confirm you want PG on low  
going over the hill. Over.

CAPCOM That's affirmative, 11.  
SC Roger.  
PAO That was Buzz Aldrin confirming the GO.  
SC If you want to, I'll put it back to  
HIGH until just before LOS. Over.

CAPCOM Negative 11. LOW is okay for now. Over.  
SC Roger.  
SC Houston, do you want to give me a time  
check, please?  
CAPCOM Roger. I'll give you a mark at 13 minutes  
and 30 seconds to ignition.  
SC Okay, and then a GET, please.  
CAPCOM Stand by a minute.  
CAPCOM I'll give you a time hack on the GET  
at 75 hours 37 minutes and I'll show you a bias at about  
a second and a half to allow for the time of flight.

SC Okay.  
CAPCOM Stand by. Mark, 75 hours 37 minutes GET.  
SC Thank you.  
CAPCOM And I'll give you a time hack on time  
to ignition at 12 minutes to ignition. Over.

SC Okay.  
CAPCOM Stand by for a MARK at TIG minus 12.  
MARK TIG minus 12.  
SC You were right on, Bruce, thank you.  
CAPCOM Roger, out.  
PAO We are 3 minutes away from loss of signal.  
Apollo 11 is 425 nautical miles from the Moon, velocity  
7368 feet per second, weight 96 012 pounds.

CAPCOM 2 minutes to LOS.  
CAPCOM Apollo 11, this is Houston. All your  
systems are looking good going around the corner and we'll  
see you on the other side. Over.  
SC Roger. Everything looks okay up here.

APOLLO 11 MISSION COMMENTARY, 7/19/69 CDT 11:58 GET 75:26 228/2

CAPCOM

Roger, out.

PAO

And we've had loss of signal as Apollo 11 goes behind the Moon. We were showing a distance to the Moon of 309 nautical miles at LOS, velocity 7664 feet per second. Weight was 96 012 pounds. We're 7 minutes 45 seconds away from the LOI number 1 burn, which will take place behind the Moon out of communications. Here in the Control Center 2 members of the backup crew, Bill Anders and Jim Lovell, have joined Bruce McCandless at the CAPCOM console. Fred Haise, the third member of the backup crew, has just come in, too, and Deke Slayton, Director of Flight Crew Operations, is at that console. The viewing room is filling up. Among those we noticed on the front row in the viewing room are Astronauts Tom Stafford, John Glenn, Gene Cernan, Dave Scott, Al Worden, and Jack Swigert. With a good lunar orbit insertion burn the Madrid station should acquire Apollo 11 at 76 hours 15 minutes 29 seconds. Aquisition time for no burn 76 hours 05 minutes 30 seconds.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 12:16, GET 75:44 229/1

PAO

This is Apollo Control at 75 hours, 49 minutes. Apollo 11 should have started this long burn duration 6 minutes, 2 seconds, DELTA V 2917 feet per second. Given that burn we expect an orbit of 61 by 169.2 nautical miles. We're 24 and one-half minutes away from acquisition of signal with a good burn. The clock has not yet started counting for the other acquisition time. We'll take this lying down now and come back just prior to the acquisition in time for no burn. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 12:36, GET 76:04 230/1

PAO

- and we'll stand by.

PAO

We are passed the burn acquisition now and we have received no signal.

PAO

It's very quiet here in the control room. Most of the controllers seated at their consoles, a few standing up, but very quiet.

END OF TAPE

PAO We're 7 minutes from acquisition time.

PAO If Apollo 11 achieved only a partial burn, we could receive a signal any time so we will continue to stay up until acquisition time of 76 hours, 15 minutes, 29 seconds. That time is the initial acquisition time, but it could take a little longer to lock onto the signal for voice communications. We are 4 minutes away now.

PAO There are a few conversations taking place here in the control room, but not very many. Most of the people are waiting quietly, watching and listening. Not talking.

PAO That noise is just bring up the system. We have not acquired a signal. We're a minute and one-half away from acquisition time.

PAO 30 seconds.

PAO Madrid AOS, Madrid AOS.

PAO Telemetry indicates that the crew is working on the antenna angles to bring the high gain antenna to bear.

SC (Spacecraft signal very weak - inaudible)

CAPCOM Apollo 11, this is Houston. Are you in the process of acquiring high gain antenna? Over.

CAPCOM Apollo 11, Apollo 11, this is Houston. How do you read?

SC Read you loud and clear, Houston.

CAPCOM Roger. Reading you the same now. Could you repeat your burn status report. We copied the residuals burn time and that was about it. Send the whole thing again, please.

SC They were like perfect. DELTA T 0, burn time 557, ten values on the angles, BGX minus .1, BGY minus .1, BGZ plus .1, no trim, minus 6.8 on DELTA VC, fuel was 38.8, OX 39.0 plus 50 on balance, we ran an increase on the PUGS, NOUN 44, show us in a 60.9 by 169.9.

CAPCOM Roger, we copy your burn status report, and the spacecraft is looking good to us on \* telemetry.

SC (garble)

PAO That burn report was by Neil Armstrong.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 12:55, GET 76:23 232/1

PAO This is Apollo Control. We're showing spacecraft weight in lunar orbit of 72 004 pounds.

SC Apollo 11. We're getting this first view of the landing approach. This time we are going over the Taruntius crater and the pictures and maps brought back by Apollos 8 and 10 give us a very good preview of what to look at here. It looks very much like the pictures, but like the difference between watching a real football game and watching it on TV - no substitute for actually being here.

CAPCOM Roger. We concur and we surely wish we could see it first hand, also.

PAO That was Neil Armstrong.

SC We're going over the Messier series of craters right at the time, looking vertically down on them and Messier A we can see a good size blocks in the bottom of the crater. I don't know what the altitude is now but that indicates that those are pretty good size blocks.

CAPCOM Okay. Just roughly it looks like you are about 120 miles or 130 miles right now. Make that 127 miles.

SC We're approaching PDI point now, over.

SC There's Secchi in sight.

SC We're going over Mt. Marilyn at the present time and its ignition point.

CAPCOM Roger. Thank you. And our preliminary tracking data for the first few minutes shows you in a 61.6 by 169.5 orbit over.

SC Roger.

CAPCOM And Jim is smiling.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 76:39, CDT 13:11 233/1

CAPCOM Apollo 11, this is Houston. Over.  
SC Go ahead.  
CAPCOM 11, Houston. During your SPS burn as played back on tape down here, we've observed the nitrogen tank BRAVO pressure in the SPS system dropping a little bit more than we anticipated. It's holding steady right now. We'll continue to watch it and keep you posted if anything comes up. Over.  
SC Roger. Thank you.  
CAPCOM Right. And it has held - -  
SC Currently going over mascon map.  
CAPCOM Okay.  
SC And Boothill, Duke Island, Side-winder, looking at mass one W that's the yaw round checkpoint, and just coming into the terminator at - at the terminator it's ash and gray. If you get further away from the terminator, it gets to be a lighter gray, and as you get closer to the subsolar point, you can definitely see browns and tans on the ground according to the last Apollo 11 observation anyway.  
CAPCOM Roger, 11. We're recording your comments for posterity.  
SC Okay.  
PAO And again, that was Neil Armstrong with the report.  
SC In the background do they accuse us of being compromisers?  
SC And landing site is well into the dark here. I don't think we're going to be able to see anything of the landing site this early.  
CAPCOM Apollo 11, this is Houston. When you have a free minute, could you give us your onboard readout of N2 tank BRAVO, please, and we'd like to make sure you understand that ever since you stopped thrusting with the SPS the temperature in the tank has remained steady. Over. Make that the pressures remained steady.  
SC Rog. We understand tank pressure has stayed steady. Thank you.  
SC Roger. We're showing the N2 tank pressure and the tank BRAVO to be 1960, something like that, and alpha is, oh, about 2250. Over.  
CAPCOM Roger. We show 2249 in alpha and 1946 down here.  
SC All right.  
SC Houston, Apollo 11. How about coming up with some roll, pitch, and yaw angles in which to stop this so called orb rate that I'm doing.  
CAPCOM Roger. Stand by.

APOLLO 11 MISSION COMMENTARY, 7-18-69, GET 76:39, CDT 13:11 233/2

CAPCOM We'll have them for you in a  
minute. Roger.

SC Okay, and it's time to stop  
also.

CAPCOM Yes indeed.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM Roger. We show you in the flight  
plan today in orbital rate until about 79 hours, 10 minutes.  
Do you have some particular attitude or reason for wanting  
to go inertial? Over.

SC No, that's fine. I just wanted  
to confirm that. Until 79:10 then we'll breeze around here  
in orbit.

CAPCOM Roger. And we've got an observa-  
tion you can make if you have some time up there. There's  
been some lunar transient events reported in the vicinity  
of Arastorkus. Over.

SC Roger. We just went into space-  
craft darkness. Until then, why we couldn't see a thing  
down below us, but now with earthshine, the visibility is  
oh, pretty fair. I'm looking back behind me I can see the  
corona from where the sun has just set, and we'll get out  
the map and see what we can find around Arastorkus.

CAPCOM Okay, Arastorkus is at angle  
echo 9 on your ACO chart. It's about 394 miles north of track,  
however, at your present altitude which is about 167 nautical  
miles, it ought to be over - that is within view of your  
horizon, 23 degrees north, 47 west, and take a look and see  
if you see anything worth noting up there. Over.

SC Hold a second.

CAPCOM Roger, out.

END OF TAPE

PAO That was Buzz Aldrin discussing the  
earth shine.

SC Houston, 11. It might help us a little  
bit if you could give us a time of crossing 45 west.

CAPCOM Say again, please 11.

SC You might give us a time of crossing of  
45 west and then we'll know when to start searching for  
Aristarchus.

CAPCOM Roger, you'll be crossing 45 west at  
77:04:10 or about 40 seconds from now. Over. 30 seconds  
from now.

SC Okay.

CAPCOM Apollo 11, when we lose the S-band we'd  
like to get OMNI CHARLIE from you and update my last. That  
77:04 was the time when Aristarchus should become visible over  
your horizon. 77:12 is point of closest approach south of it.  
Over.

SC Okay, that sounds better because  
we just went by Copernicus a little bit ago.

CAPCOM Roger, we show you at about 27 degrees  
longitude right now.

SC Righto.

SC Houston, when a star sets up here there's  
no doubt about it. One instant it's there and the next  
instant it's just completely gone.

CAPCOM Roger, we copy.

CAPCOM Apollo 11, this is Houston. We request  
you use OMNI CHARLIE at this time. Over.

SC Okay, going to OMNI CHARLIE.

CAPCOM Roger, out.

SC Houston, Apollo 11.

CAPCOM Apollo 11, this is Houston. Go ahead.

SC Roger. Seems to me we know orbits  
so precisely and know where the stars are precisely and the  
time setting of a star or a planet to a very fine degree  
that this might be a pretty good means of measuring the  
altitude of the horizon.

CAPCOM Roger.

SC Hey, Houston, I'm looking north up  
toward Aristarchus now, and I can't really tell at that  
distance whether I am really looking at Aristarchus, but  
there's an area that is considerably more illuminated than  
the surrounding area. It just has - seems to have a slight  
amount of fluorescence to it. As a crater can be seen in  
the area around the crater is quite bright.

CAPCOM Roger 11, we copy.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 13:46, GET 77:14 235/1

SC Houston, Apollo 11, looking out the same area now and it does seem to be - reflective ability of earthshine I'm not sure whether it was worked out to be about zero phase, well, at least there is one wall of the crater that seems to be more illuminated than the others and that one (garble) lining up with the earth and does seem to put it about at zero phase. That area is definitely lighter than anything else that (garble). I am not sure that I am really identifying any phosphorescence, but that definitely is lighter than anything else.

CAPCOM 11, this is Houston. Can you discern any difference in color of the illumination and is that an inner or outer wall from the crater. Over.

SC I checked an inner wall in the crater.

SC No, there doesn't appear to be any color involved in it, Bruce.

CAPCOM Roger. You said inner wall, would that be the inner edge of the northern surface?

SC I guess it would be the inner part of the west northwest part. The part that would be more nearly normal if you were looking at it from the earth.

CAPCOM 11, Houston. Have you used the monoculars on this? Over.

SC Stand by one.

SC Roger. (Garble) caused me to lose my (garble). It is supposed to be here somewhere but I can't find it.

CAPCOM 11, this is Houston. We're (garble).

SC Houston, we will give it a try, if we have the opportunity on next - when we are not in the middle of lunch and try to find the monocular.

CAPCOM Roger. Copied you that time and expect in the next rev you had better be getting ready for LOI, 2, so, let's wind this up and we've got some other things to start you on. Over.

SC Okay.

PAO Apollo 11 will be in acquisition for another 20 minutes during its first revolution of the moon.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston. Over.

APOLLO 11 MISSION COMMENTARY, 7/29/69, CDT 13:46, GET 77:14 235/2

CAPCOM 11, this is Houston. We're planning to make the LOI 2 burn now using bank A only. We'll have the pad and everything for you next time around. Just trying to economize a little on bank B. Bank B is holding now.

SC Roger. Understand.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-19-69, GET 77:24, CDT 13:56 236/1

CAPCOM Apollo 11, this is Houston.  
Over.  
SC Go ahead.  
CAPCOM 11, Houston. In order to improve the communications a little bit here, we'd like to try to get you on the high gain antenna. We're recommending a pitch angle of 0, yaw 355, I say again 355, the track switch to manual and wide beam width, over.  
SC Okay, you ready to switch to high gain now?  
CAPCOM That's affirmative. 11, Houston.  
Do you read?  
SC Roger. We read you. It seems to be rather marginal for the high gain.  
CAPCOM Roger. We concur.  
SC Houston, Apollo 11. Could you give us a time of crossing the prime meridian 150 west?  
Over.  
CAPCOM Roger. Stand by about a half a second, here. Okay, your time of crossing of 150 west meridian will be 775005. Over.  
SC Thank you.

END OF TAPE

CAPCOM 11, this is Houston. We have about 6 minutes remaining until LOS and in order that we may configure our ground lines we'd like to know if you're still planning to have the TV up with the beginning of the next pass. Over.

SC Roger, Houston, we'll try to have it ready.

CAPCOM This is Houston. We are inquiring if it is your plan to. Over.

SC It never was our plan to, but it's in the flight plan so I guess we'll do it.

CAPCOM Houston, roger, out.

CAPCOM 11, Houston.

SC Roger, go ahead.

CAPCOM For use in connection with the prime meridian crossing you have an orbital period now of 2 hours 8 minutes and 37 seconds. Over.

SC Thank you.

CAPCOM Roger, out.

CAPCOM Apollo 11, this is Houston. A little over 2 minutes to LOS. All your systems parameters and orbit are looking good from the ground. We have AOS on the other side at 78:23:31. Over.

SC Roger, 78:23:21.

CAPCOM Roger, that was 31 on the end.

SC Okay.

PAO This is Apollo Control. We've had loss of signal from Apollo 11 on its first lunar revolution. We will acquire the spacecraft on the next revolution at 78 hours 23 minutes 31 seconds. The orbital period for Apollo 11's present orbit 2 hours 8 minutes 37 seconds, and as you heard we passed up to the crew information that we would perform the LOI 2 burn using only bank A. The banks are the drive mechanisms for the ball valves in the service propulsion system. They open and close these ball valves. The valves allow the fuel and oxidizer to flow into the engine. There are redundant valves and redundant banks, banks A and B. There was apparently - they are driven by nitrogen and that was the reference to the pressure drop there. It was apparently a leak in nitrogen tank B during the LOI 1 burn. This burn was performed with both banks open. The engine can be operated with only bank. It's apparent that the tank leaked only during the burn while the bank was actuated. Pressure has held steady since the end of the burn and the experts are reducing the data and looking at the leak rate, determining whether it was constant throughout the burn, precisely what the situation is. We're showing pressure in tank B of 1960 psi. In tank A 2250 psi. Both of these are well above the red lines of 400 pounds psi.

END OF TAPE



APOLLO 11 MISSION COMMENTARY, 7/19/69, CDT 14:50, GET 78:18 239/1

PAO This is Apollo Control, Houston.  
at 78 hours, 18 minutes into the flight of Apollo 11.  
Apollo 11 still passing around the far side of the moon.  
We are less than 5 minutes now away from time of acquisition  
on this second revolution for Apollo 11. The station to  
acquire on this pass will be the Goldstone wing site which  
will feed the television to Mission Control Center in  
Houston, and thence to all parts of the country. We would  
expect to come up with television perhaps some several  
minutes after acquisition since we must first lock up  
on the downlink and have the scan converter in full  
operation. So at 78 hours, 19 minutes continuing to  
monitor, this is Apollo Control, Houston.

PAO Mark 2 minutes now from time of  
predicted acquisition in Mission Control Center. We are  
standing by.

PAO Mark 1 minute now from time of  
predicted acquisition. Continuing to stand by in Mission  
Control Center in Houston.

PAO Mark 10 seconds away now. Standing  
by for acquisition. We've had AOS by Goldstone. Television  
is now on. That is Bruce McCandless -

CAPCOM Apollo 11, this is Houston. Over.

SC Apollo 11, are you picking up our  
signals, okay?

CAPCOM Apollo 11, this is Houston.  
Confirm. We are reading you loud and clear on voice and  
we have a good clear TV picture, a little gray crater on  
the bottom of the picture.

SC No.

CAPCOM I guess that is a spot on the  
tube.

SC Sorry about that one.

CAPCOM And if you give us POO and  
ACCEPT, we will uplink our state vector and target load to  
you.

SC Okay.

SC Houston, Apollo 11. One of the  
larger craters on the back side - I noticed a small, dark  
speck on the outer wall and I put the monocular on it.  
I was able to see - oh, an area, maybe a quarter of a mile  
in diameter. A really fresh looking dark colored pit  
and that seems to be in contrast with all the other fresh  
little craters or holes, that you can perceive on the walls  
of any of these craters. Around this particular one  
there seems to be two or three of these - especially the

SC one that caught my attention.  
Quite remarkable. Over.

CAPCOM Roger. Do you have a location  
on that one?

SC No, not of (garble). I've  
got several pictures of it though.

CAPCOM Roger. We copy.

PAO That was Buzz Aldrin making  
a report, a geological report on that site pass.

CAPCOM We're getting a beautiful  
picture in down there now, 11. The color's coming in  
quite clearly and we can see the horizon and the relative  
blackness of space and without getting into the question  
of grays and browns, it looks, at least on our monitor  
a sort of a brownish gray.

SC (Garble) the way they're  
describing it. It appears to me as though it made a  
difference just sitting back in the tunnel and gazing at  
all windows, it makes a difference which one you're looking  
out of. For example, the camera right now is looking out  
the number 5 window and it definitely gives a rosier or  
tanner tinge, especially when you look straight through  
it and not at an angle. Over.

CAPCOM Roger.

SC G&C flight.

SC 95 or 100 degrees (garble)

SC Still holding. Okay.

CAPCOM Say again. Over.

SC I'd say again we're about  
95 degrees east, coming up on Smyth's Sea.

CAPCOM Roger. And for your informa-  
tion, we show you at an altitude of about 92 miles above  
the surface right now.

END OF TAPE

SC about 95 degrees east coming up on Smyth's Sea.

CAPCOM Roger, and for your information we show you at an altitude of about 92 miles above the surface right now.

SC Okay.

SC Houston, Apollo 11. Could you observe a difference in the N2 pressures before LOI? It seems to me as though the two were not equal on the (garbled) B tank was a little low on pressure. Over.

SC I'm flying in an SPS minimum impulse, Houston, and it's rather difficult to keep it on a constant data. The LM wants to wander up and down. I'm not sure if it's in response to mascons or what, but I can get it completely stabilized in data and let it alone and in another couple of minutes it will have developed its own rate.

CAPCOM This is Houston, Roger.

PAO That was Mike Collins making that report.

SC Houston, we'll be moving shortly from the side window to the hatch window, and we'll try and pick up some of the landmarks that we'll be looking at we approach the powered descent. Over.

CAPCOM 11, this is Houston. Roger, and we're through with the uplinks. The computer is yours, you can go to BLOCK and we'll have the information on nitrogen for you shortly. Over.

SC Roger, copy.

SC Okay, Houston, several minutes ago I was exactly steady on data and since then I have been moving forward, the LM pointed straight down toward the radius vector and that's been despite a number of down minimum pitch impulses.

CAPCOM Roger.

SC We're over Smyth's Sea right now.

CAPCOM Roger.

SC We're about 88 degrees east of it I would estimate.

CAPCOM We show you about south of the - southwest of the crater Jansky right now.

SC The Smyth's Sea doesn't look much like a Sea. It's - the area which is devoid of craters of which is not very much is sort of a hilly looking area. It's not like the Mare at all.

CAPCOM Roger. We copy that about the sea, and it looks like you were just giving us a zero of the crater Neper, the large crater on the left, and Jansky on the right.

PAO That exchange between Capcom Bruce

McCandless and Mike Collins aboard the Apollo 11 spacecraft.

SC We think you're close, but not too good.

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:00 GET 78:28 240/2

PAO Apollo Control, Houston. We acquired TV at 78 hours, 24 minutes, 11 seconds. Currently our orbital parameters show 104. Altitude an apolune of 170.2, a perilune of 61.3 - nautical miles, those are.

CAPCOM 11, this is Houston. Would you care to comment on some of these craters as we go by?

SC Roger. We're approaching the approach pass through ignition. This is equivalent to 12 minutes before ignition, and we're at about 83 degrees, I guess. 83 degrees east. Does that correspond to locations you're holding there presently?

CAPCOM Roger. We're showing your present position as about 77 - 76 degrees east looking back towards the east.

SC You should be looking back at Manzinus.

CAPCOM Roger.

PAO We've now heard from all three Apollo 11 crewmembers during this television pass. The individual talking earlier was Neil Armstrong.

SC Crater Schubert and Gilbert in the center right now, and that sums it up at about a little over 12 minutes before powered descent. Instead of me looking - as they're looking back at it, we're looking straight down at it.

CAPCOM Roger. We show you at an altitude now of about 110 miles, and of course, you'll be considerably lower at the initiation of powered descent.

SC Say, Houston. Look at register 3 on the DSKY data. Updata is increasing toward my desired 315 and I'll let the hand controller alone here and I'll bet you it reverses itself.

SC Roger, 11. We're watching the DSKY now and it's still coming in beautifully on the TV.

SC Okay, there's - on the right side of the screen at the present time there's a triple crater with a small crater between the first and second, and the one at the bottom of the screen is Schubert Y. (Garble) it does have a central peak at Schubert Y. There's actually several of them. You can observe those, plus the rim craters at the bottom of your screen.

CAPCOM Roger. We're seeing the central peak quite clearly now.

SC Okay, we're zooming in now on a crater called Schubert N. Schubert N, very conical inside wall and the bottom of it here looks flat. Look at data on the DSKY it's stabilized and is holding steady now.

CAPCOM Roger.

SC Looking out the window I can see a number of tall craters on the bottom of ShubardtN. We're coming up on the Bombing Sea where I'll be doing some P22 marking on crater of my choice - name of crater Camp.

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:00 GET 78:28 240/3

CAPCOM Okay, we'll be watching for that.

SC And notice register 3 has reversed itself and it's heading back the other way now without any pitch thruster firing.

CAPCOM Roger, Mike. We confirm that you've changed the direction of your pitch rate.

END OF TAPE

SC Generally speaking, the tendency seems to be to pull the LM down toward the - the center of the Moon as a gravity engradiant experiment.

CAPCOM Roger, 11, we copy -

SC It may have something to do with mascons or it may -

CAPCOM Roger, we gotten -

SC It may have something to do with mascons or it may just be the peculiarity of the DSKY display.

CAPCOM Okay, we observed the behavior of your DSKY and we got the day ahead to work on it. Let us grind around a little while on it and we will report back to you probably in a rev or two.

SC Okay, well in the meantime I am going to pitch down toward 315.

CAPCOM Roger.

SC Three craters, three horizontal craters, that we now have in the field of view, are immediately underneath the ground track. The right-hand, the largest crater that you see, is through the (garble).

CAPCOM Roger, we concur on the identification of this crater.

CAPCOM - and we show you coming up on landmark ALPHA 1 shortly.

SC Roger, Mike is having his first look at ALPHA 1 at the present time.

SC Yeah, it is a great bright crater. It is not a large one but an extremely bright one. It looks like a very recent and I would guess impact crater with rays streaming out in all directions which should make ... correction the Foaming Sea easy to see coming up on it now. Crater ... is one of the smaller ones out on the - on the floor of the Foaming Sea.

PAO We have been some 17 minutes now into this television pass and standing by continuing to monitor.

CAPCOM Here we can show you over the Sea of Fertility now and we ought to have Langrenus down south of track a few degrees, about 9 degrees south of track.

SC Now the crater that is in the center of the screen now is Webb. We'll be looking straight down on it at about 6 minutes before power descent. It has a relatively flat bottom to the crater and you can see maybe two or three craters in the bottom of it on the west end wall, the wall that is now nearest the - the camera, near the bottom of the screen we should see a dimple crater there, within the outside and then coming back toward the bottom of the screen into the left, you can see a series of depressions. It is this type of connective craters that give us most interest to discover why they are in the particular pattern that they are in. I'll zoom the camera in and try and give you a closer look at it.

CAPCOM Roger, we are observing the dimple crater now. The central peak we can see on the other photos

CAPCOM doesn't seem to stand out very well here.  
SC Well, they are not central peaks, they  
are depressions in the center.

CAPCOM Roger.  
SC And you will notice on the pitch thruster  
activity, I've put in oh a dozen interim impulses and pitch down  
and I am still far from corrective back 315. We are moving the  
camera over to the right window now to give you well Langrenus.  
It - its several central peaks and -

CAPCOM Roger, we got Langrenus in our screen now.  
CAPCOM Okay, 11, this is Houston. We are getting  
a beautiful picture of Langrenus now with its really conspicuous  
central peak.

SC The Sea of Fertility doesn't look very  
fertile to me. I don't know who named it.

SC Well, it may of been named by - a gentleman  
whom this crater was named after, Langrenus. Langrenus was a  
cartographer to the King of Spain and made one of the early  
reasonably accurate maps of the Moon.

CAPCOM Roger, that is very interesting -

SC At least it sounds better for our pur-  
poses than the Sea of Crises.

CAPCOM Amen to that.

CAPCOM Okay, it looks like you are coming in-  
side now on the camera.

SC Well, I can't get in behind to see the  
monitor. I'll bring the focus in but we are going to be looking  
down past one of the LM quads and one of the antennas almost  
straight down at the ground track that we will be seeing coming  
in now. Guess it maybe two or three minutes before power  
descent.

SC All right, that should put the LM  
structure about in focus and I'm going to move it out to  
Serenity and then expand the field of view.

SC Crater Secchi is out my window now,  
window number 02.

CAPCOM Hello Apollo 11, this is Houston.  
We see you coming up on the terminator at 7853. It will be  
about 7 minutes from now and we also got the LOI 02 and TEI  
05 pad ready for you after the TV and when you ever want to  
terminate, over.

SC Roger.

CAPCOM And we are getting a good view of the  
track leading into the landing site now and -

CAPCOM Okay, it looks like we got Secchi K -  
coming up on Apollo ridge.

CAPCOM And in the right hand portion of our  
screen right now, we can see Messala , ALPHA and BRAVO with  
a little light color rays streaming off in one direction.

SC I don't know if you can make out, but

SC in the Sea of Fertility there is a number  
of craters that are just barely discernible, old, old craters  
whose outlines are just barely able to be seen.

CAPCOM Roger, I think we can make them out.  
The color really inha -

SC The outlines are just barely able to be seen.

CAPCOM Roger, I think we can make them out. The color really enhances the ability to discern features and craters over what we see in real time on our black and white monitor.

SC Right, at these low sun angles there's no trace of brown, it's now returned to a very gray appearance and, like the acre says, it has a look of plaster paris to it, at this sun angle which is completely lacking in earth angle.

CAPCOM Roger.

PAO We're now some 25 minutes into our television pass.

SC Okay this is very close to ignition point for power descent. Just passing Mount Maryland, a triangular shaped mountain that you see in the center of the screen. At the present time with crater secchi (garbled) on top of the far northern edge of the mountain.

CAPCOM Roger, we're getting a good view of mount Maryland and Secchi satum.

SC And now we're looking at what we call boot hill, occurs 20 seconds into the descent.

PAO Watching this pass with a great deal of interest here in mission control center is Pete Conrad, the commander for the Apollo 12 mission.

SC On the right edge of the screen crater censorinus P. Now passing the 1 minute point in power descent.

CAPCOM Roger, and for your information your current altitude is 148 nautical miles above the surface.

SC It should be. I'm unable to determine altitude at all looking out the window. I couldn't tell whether we were down at 60 or up at 170.

CAPCOM I bet you could tell if you were down at 50,000 feet.

SC I wouldn't be surprised.

SC We're passing some steep ridges here. The edge of the moon craters that were photographed by Apollo 10, and the crew of Apollo 10 was very impressed with the steepness of these ridges when they came over them at about 50 thousand feet.

CAPCOM Roger, we can observe there also steep even from this altitude. You've got quite a shadow being casted by the sun at these low angles.

SC The entire surface is getting considerably darker than the surface that we looked at previously when the sun was quite high above us. The crater in the, bright crater

SC in the center of the screen, the smaller one is censorinus.

CAPCOM Roger, and we show you low over 1 minute from the terminator at the present time.

SC How's the brightness of that picture you're receiving? Do you think we ought to open F-stop some as we approach the terminator.

CAPCOM Yea, the brightness is still doing quite well. You can go ahead and open it up a stop or two. The automatic white level compensation seems to be working beautifully.

SC There's a good picture of Boot Hill.

CAPCOM Roger.

SC 3 minutes and 15 seconds into the descent.

CAPCOM Roger, we're seeing Boot Hill now.

SC The next crater coming into the bottom of Duke Island there, and to the left, the crater, the largest of the craters, near the center of the picture right now is Maskelyne W. This is a position check during descent at about 3 minutes and 39 seconds, and it's our downrange position check, and cross range position check prior to yawing over face up to acquire the landing radar. Past this point, we would be unable to see the surface below us until getting very near the landing area.

CAPCOM Roger, I imagine you get a, you'll get a real good look at that tomorrow afternoon.

SC (garbled) is the one that was referred to in Apollo 10 as Sidewinder.

SC That's a good name too. Sidewinder, and Diamondback, it looks like a couple of snakes down there in the lake bed.

SC And we're approaching the terminator now. See the (garbled) has increased and only the sunlit side of these ridges remain illuminated, while the dark sides and the shadow will become completely black.

CAPCOM 11, this is Houston. The picture is getting a little grainy now. You might go ahead and open up the F-stop.

SC Landing point is just barley in the darkness. That one crater, the upper part of which you see, lower part completely in darkness. The small well defined crater is Moltke, which is about a beam in the landing sight.

CAPCOM Roger, we can just see it looks like a little less than half of its rim right now.

CAPCOM And we can make out just barley some features on the surface, maybe from earth shine.

CAPCOM Are you wide open on the F-stop, at this time.

SC Now we are. Yea and it looks like we're just about to get the sun coming into the lens so we'll have to move the camera light.

CAPCOM Roger.

SC We can't see any earth shine or any surface features at all in earth shine now due to the fact that the LM is very bright and is causing our pupils to contract. It's a very fantastic view to see the terminator as you look along the edge. I think you'll agree that some of these craters that you're seeing in the picture now are really accentuated by the lengthening of the shadows, as compared to the terminator.

CAPCOM Yes it's a very beautiful and rugged sight we've got on the screen now.

SC And I think you've got some interesting data on thruster firing versus pitch angle. It looks like that LM just wants to head down towards the surface is all.

CAPCOM Roger, I have a comment here that says that's what the LM was built for, I believe.

SC And as the moon sinks slowly in the west, Apollo 11 bids good day to you.

CAPCOM Roger, we sort of thought it was the sun setting in the east.

PAO There you have it. Our first glimpse of the lunar surface during the Apollo 11 mission. The eleven crew took us on a guided tour of the front side, plus talked their way through the power descent that lies ahead in tomorrow's activities. At 78 hours 58 minutes into the flight of Apollo 11, this is Apollo Control, Houston, continuing to monitor.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:30 GET 78:58 243/1

PAO Apollo 11. This is Apollo Control, Houston, continuing the monitor.

CAPCOM Now here we go on the LOI2, Buzz (garble) LOI2, SPS G&N 38320 plus 166 minus 081. Tega 080113603. Noun 81 minus 01408 minus all balls minus 00743. Roll all balls 196359 00657 plus 00537. Delta-VT 01592 017 01531. Sextant star 231160 138. The rest of the pad is NA. GDC Align Vega and Deneb 243183012. Ullage 2 jets 19 seconds. Remarks: on your DAP load we would like in R1 20101 Vice the value which appears in the flight plan. In making the sextant star check - this must be done between GET 79:30:10, at which time the star comes above the horizon and 79:52:10, which is your local sunrise due to the fact that the star's relatively close to the sun. Your burn orientation is heads down, retrograde pitched up 28 degrees with respect to local horizontal. The calculated values for Noun 42 are HA 65.6 and HP 54.6. Both of those being plus. Readback. Over.

SC Roger. LOI2. SPS G&N 38320 plus 166 minus 081080113603 minus 01408 minus all balls minus 00743 all zeros 196359 00657 plus 0053701592 01701531 231160 138. Vega Deneb 243183012 2 jets 19 seconds. DAP R1 20101. Sextant star between 79:30:10 and 79:52:10. Attitude is heads down, retrograde, pitched up 28 degrees. HA after the burn - was that Noun 42 for HA and 64.6 and HP 54.6? Over.

CAPCOM Roger. On the Noun 42 value, the last stuff you gave, HA is 65.6, HP is 54.6. Otherwise, I readback correct. I'm standing by with your TEI5 pad. Over.

SC Roger. HA 65.6 for Noun 42, and a rating on B.

CAPCOM 11, this is Houston. TEI5 SPS G&N 37201 minus 060 plus 047. Tega, 086 093666. Noun 81 plus 33521 plus 03441 minus 01458. Roll NA, pitch 032. The rest of the pad is NA. Ullage 2 jets, 16 seconds, undocked. Over.

SC Roger. TEI5 SPS G&N 37201 minus 060 plus 047086093666 plus 33521 plus 03441 minus 0145458. NA 032. Rest is NA, 2 jets 16 seconds undocked. Over.

CAPCOM Apollo 11, this is Houston. readback correct. Out.

CAPCOM Apollo 11, this is Houston.

SC Houston, you want us back on downvoice backup? Over.

CAPCOM Apollo 11, this is Houston. That's affirmative on the downvoice backup. We'd like you to confirm your uptelemetry switch in the normal position. Over.

SC Roger. It's in BLOCK. Did you get us the - you got us a new CSM state vector and an LOI target load in between all that television, didn't you?

CAPCOM That's affirmative. And, what I'm asking for is the switch over to -

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:30 GET 78:58 243/2

SC Yes, the uptelemetry switch is in normal. Over.

CAPCOM Roger. Out.

END OF TAPE

PAO This is Apollo Control, Houston at 79 hours 9 minutes now into the flight of Apollo 11. We currently read an apolune of 170.2 nautical miles a perilune of 61.2 nautical miles. Those listing of figures that you heard passed up to the crew were maneuver pad updates. The first group for LOI2. We're now looking at the time of burn of 80 hours 11 minutes 36 seconds, which should revise our orbital parameters to 65.7 nautical miles by 53.7 nautical miles. A Delta-V of 159.2 feet per second, and a burn duration of 17 seconds, some 17 seconds. So at 79 hours 9 minutes into the flight of Apollo 11, continuing to monitor, this is Apollo Control, Houston.

PAO This is Apollo Control, Houston. At 79 hours 18 minutes now into the flight of Apollo 11. A quiet period at this time, as the Apollo 11 spacecraft continues its pass around the front side of the moon. Our current altitude, very close to apolune, now reading 166.7 nautical miles. Our orbital parameter is 170.2 by 61.2 nautical miles. Current spacecraft weight in orbit, 71,622 pounds. We'll continue to keep the line up and continue to monitor the Apollo 11 crew. No doubt, at this time, preoccupied very probably with the alignment of their G&N platform. At 79 hour and 19 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

CAPCOM Apollo 11, this is Houston.  
Over.

SC Go ahead, Houston.

CAPCOM Roger. During the LOI1 burn, your engine burned a little bit more propellant than we predicted and consequently, we'd like to update, or send you a new TEI 4 pad. Over.

SC Okay. Our chamber pressure onboard was higher that time too. It's all on the onboard tape, the time history and the chamber pressure, but to make a long story short, it worked its way up to 100.

CAPCOM Roger. And down here we showed a chamber pressure of around the order of 103 to 104 psi during your burn on playback.

SC Okay. Go ahead with the TEI 4.

CAPCOM Roger. TEI 4 revised, SPS G&N, 38320, minus 055 plus 060, 084, 30, 2749, plus 31380, plus 03475 minus 01032, roll at A

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:55 GET 79:23 245/1

CAPCOM 5 minus 01032, roll A, pitch 034.  
The rest of the pad is NA. Ullage 2 jets 16 seconds. Undock.  
No LOI2. Over.

SC S10 TEI4 SPS G&N 38320 minus 055  
plus 060 084 302749 plus 31380 plus 03175 minus 01032. A  
034. All the rest of the pads NA. 2 jets 16 seconds undock,  
no LOI2.

CAPCOM 11, this is Houston. Readback correct.  
Out.

PAO This is Apollo Control, Houston, at  
79 hours, 25 minutes. That maneuver pad that was transmitted  
to the crew - that was TEI, or transearth injection burn for  
the fourth revolution, is a contingency pad only to assure  
that it is properly onboard the spacecraft, if any unlikely  
event it should become necessary to return. At the present  
time we read an altitude of 157.7 nautical miles descending  
from apolune at this time. And our orbital parameters read  
170.2 nautical miles, 61.2 nautical miles. We're some 23  
minutes away at the present time from loss of signal. At  
79 hours, 26 minutes into the flight of Apollo 11, this is  
Apollo Control, Houston.

CAPCOM Apollo 11, this is Houston.

SC Roger. Go ahead, Houston.

CAPCOM Roger. We've been looking at your  
systems data on playback and everything is looking good. In  
particular, the SPS looks good. I would like to remind you  
though of a request to perform this burn on the back A ball  
valves only, and you are go for LOI two. Also, we have  
currently in the flight plan you scheduled tomorrow to start  
entering the LM at about 96 hours GET and we'd like to know  
if you have any plans to initiate this ingress into the LM  
earlier. If so, we can call the people in ahead of time. Over.

SC Well, we didn't have any plans to.  
No. We just wanted to be ready at that time.

CAPCOM Well, Roger. We just wanted to make  
sure that we were ready when you were ready. Over.

SC Okay. And, to get to think of a  
star in LOI2, that's roll 0. Is that affirm?

CAPCOM That's affirmative. Roll 0.

SC Okay.

PAO This is Apollo Control, Houston.  
We're some 14 minutes away now from loss of signal with the  
command and service module of Apollo 11. At 79 hours, 34  
minutes, this is Apollo Control, Houston, standing by.

PAO This is Apollo Control, Houston, at  
79 hours, 38 minutes now into the flight of Apollo 11. Apollo  
11 now 130.4 nautical miles in altitude. Current velocity  
reading of 5131 feet per second. Orbital parameters: apolune  
170.2 nautical miles with a perilune reading 61.3 nautical miles.

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 15:55 GET 79:23 245/2

PAO Apollo 11, at this time, has completed  
it's platform alignment and is maneuvering the spacecraft to  
its burn attitude.

END OF TAPE

PAO 3 nautical miles. Apollo 11, at this time, has completed its platform alignment and is maneuvering the spacecraft to its burn attitude. We are some 33 minutes away, now, from time of ignition for the lunar orbit insertion number 2 burn, and we're 9 minutes 40 seconds away from loss of signal with the Apollo 11 spacecraft. So at 79 hours 39 minutes, this is Apollo Control, Houston.

CAPCOM Apollo 11, Houston. Five minutes till LOS and with respect to your request for the nitrogen bottle pressures preburn, just before the burn, we were showing 2270 pounds per square inch on bottle Alpha, and 2350 on bottle Bravo. Over.

SC Apollo 11, roger, thank you.

CAPCOM Roger.

CAPCOM Apollo 11, this is Houston.

2 minutes to LOS. You're AOS on the other side is 80:33:21, and the friendly white team will see you when you come out from behind the moon.

SC Apollo 11. Roger.

CAPCOM Make that your friendly greens.

Your friendly white team capcom will see you when you come out from behind the moon. I think it's basically the maroon team here, and we greenies are leaving.

SC Okay, I don't blame you, Hank.

CAPCOM I'd rather be up there.

PAO Mark, 30 minutes - 30 seconds

now from predicted time of loss of signal. Standing by. 10 seconds. Apollo 11 should now be passing out of range.

PAO This is Apollo Control, Houston

at 79 hours 51 minutes now into the flight of Apollo 11. We are some 20 minutes away, at this time, of ignition for lunar orbit insertion burn number 2. This - the fine tune second burn in the series of two as we have inserted into lunar orbit. For LOI2, the Apollo 11 will be heads down. The burn will be initiated near perilune as the spacecraft passes over the far side of the moon. Retrograde, like LOI1, but unlike Apollo's 8 and 10. The burn will not be targeted to place a spacecraft into a precise circular orbit. Taking what was learned on Apollo 10, this LOI2 burn is designed to take into account predicted perturbations and gradually circularize itself. The numbers that we're looking at for LOI2, that would be time of ignition, 80 hours 11 minutes 36 seconds, which should change our orbital parameters, giving us an apolune of 65.7 nautical miles and a perilune of 53.7 nautical miles. The Delta-V intended for this burn, 159.2 feet per second. Burn duration anticipated 17 seconds. That's a burn of short duration, but certainly important in that it establishes the proper orbital parameters for the events that lie ahead. As you heard in earlier conversation,

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 79:38:00, CDT 16:10 246/2

PAO between our capsule communicator, Bruce McCandless and crewmembers aboard the spacecraft. We're GO for LOI 2. During this burn, we'll utilize only the bank A ball valve. The bank referred to here, which there are two mechanisms that drive the ball valves open and shut, causing fuel and oxidizer to mix for ignition. At the present time in Mission Control Center, the last reference you've heard from our capsule communicator reflects that they, on their own peculiar shift schedule, are having a change of shift. Astronaut Charles Duke has arrived on the scene and we can assume will take over the responsibilities of the conversational flow with the Apollo 11 spacecraft, once we reacquire. At 79 hours 55 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-19-69, CDT 16:42 GET 80:10:00 247/1

PAO Mark 1 minute until planned time of ignition for LOI 02. Mike Collins will be at the controls for the Lunar Orbit Insertion 02 burn just as he was for LOI 01. The burn is of short duration as we have indicated earlier, some 17 seconds of burn time anticipated. We're standing by in Mission Control Center relatively quiet. Mark 30 seconds. Continuing to monitor - or read those displays that gave us our final readout prior to our passage to the backside of the Moon. Mark 10 seconds. Mark 05 seconds. We won't know for sure how the burn comes out until we acquire. Mark, plan time for ignition. At 80 hours 12 minutes now into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

PAO Mark 2 minutes from time of predicted acquisition of the Apollo 11 spacecraft. During this up coming pass, we will have our second excursion on the part of the Apollo 11 crew into - into the lunar module. The LM is to be pressurized by a valve in a tunnel hatch and as a point of interest, will remain pressurized following of this period of activation and after the members of the Apollo crew return to the command module. For this period of activation, it's definitely planned that - Buzz will go in- to the LM and there is a distinct possibility that Commander Neil Armstrong could - could exercise his option and go into the LM. Our station to acquire as we come around the far side of the Moon will be Goldstone. Mark 1 minute from predicted time of acquisition and we're standing by.

PAO Mark 30 seconds.

PAO Mark 10 seconds from predicted time of acquisition.

PAO Goldstone has acquired Apollo 11.

PAO This is Apollo Control, Houston, standing by at this time at 80 hours 35 minutes.

PAO Both Goldstone and Hawaii have acquired a signal. We will -

CAPCOM Apollo 11, Houston, we're standing by, over.

SC VGY minus .1, VGZ minus .1, DELTA VZminus 5.2, fuel 362, Fox 364, front balance plus 50 and our post burn now 94 66.1 by 54.4, go ahead.

CAPCOM Roger, we copy Neil. Would you say again the DELTA VZ? We missed that, over.

SC Roger, that was minus .1.

CAPCOM Roger, copy the burn report. Sounds good.

SC And I'll look it up here.

CAPCOM Apollo 11, Houston. We missed your DELTA TIG and also your DELTA burn time, over.

SC DELTA TIG was 0 and the burn time was 17 seconds.

CAPCOM Copy, 17.

PAO You heard that report from Commander Neil Armstrong indicating that LOI 02 was all - came off almost precisely as planned.

CAPCOM Apollo 11, Houston. We'll be satisfied if you pumped up the cabin to 5.4, over.

SC Okay, we're short about 5.2 right now.

CAPCOM Roger.

SC And Charlie, the LM CM DELTA P is just over one pound right now.

CAPCOM Copy, out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 80:41, CDT 17:13, 249/1

CAPCOM Apollo 11, Houston, over.  
CAPCOM Hello, Apollo 11, Houston, over.  
PAO This is Apollo ontrol, Houston.  
CAPCOM Please attempt to acquire on the high gain. We're having trouble locking up on the TM and we have no voice, over.  
PAO This is Apollo Control, Houston. You copied that report. We're standing by for Apollo 11 spacecraft to acquire on the high gain antenna. Meanwhile, on board readings on orbital parameters were 66.1 nautical miles by 54.4 nautical miles, very close to the planned altitudes that were predicted prior to the LOI 2 burn. At 80 hours 46 minutes continuing to monitor, this is Apollo Control, Houston.  
SC Hello Apollo 11, Apollo 11.  
CAPCOM Roger we're reading you 5 by. Go ahead.  
SC Roger we have you on high gain now.  
CAPCOM Rog, we lost the TM and the voice for about 5 minutes here. We attempted a hand over and fouled it up in some manner but we got you back now. Thank you much.  
SC Okay, we're pressurized in the LM at this time.  
CAPCOM Copy.  
PAO This is Apollo Control Houston 80 hours 48 minutes now into the flight of Apollo 11. Very preliminary ground readings indicate an apolon of 65.6 Perilon 53.7.  
CAPCOM Hello Apollo 11, Houston. We have a P22 Auto Optics update for you if you're ready to copy, over.  
SC Ready to copy.  
CAPCOM Rog, Mike. It's landmark, Alpha 1 T1823735 T2 824250. We're 7 miles north, over.  
SC Copy P22 T1 time 823735 T2 824250 and the target is 7 miles north, thank you.  
CAPCOM Rog.  
PAO That - -

END OF TAPE

PAO That was passed up to Mike Collins, the command module pilot, who will occupy himself during this pass on the over the front side with landmark tracking activities. At 80 hours, 53 minutes into the flight of Apollo 11, we continue to monitor.

SC I get the distinct impression, Charlie, that Maria there laps up over the edge of the mountains at the shorelines.

CAPCOM Roger; we copy.

PAO This is Apollo Control, Houston, at 80 hours, 56 minutes now into the flight of Apollo 11. Our current velocity reading 5334 feet per second. Current weight of the spacecraft in orbit, 75 505 pounds.

CAPCOM Houston. On your comment about the Maria lapping up to the terrain - mountain of terrain - is that an impression like a lava flow coming in around a prominence, Neil, or more looks like it's sloping up at that point? Over.

SC It isn't true everywhere, but there's certainly places where there seems to be a slope downward towards the shoreline on the Maria. In other words, from the Maria down to the shoreline is a downward slope indicating that it might be a lava flow.

CAPCOM Roger.

PAO That was Commander Neil Armstrong talking to our Capsule Communicator Charles Duke. Our current orbital readings show an apolune of 65.5, a perilune of 53.7 nautical miles. At 80 hours, 58 minutes into the flight, we continue to monitor, and this is Apollo Control, Houston.

SC Crossing Duke Island and Maskelyne W.

CAPCOM Say again, Neil. Over.

SC We're just crossing Duke Island and Maskelyne W.

CAPCOM Roger.

PAO This is Apollo Control, Houston, at 81 hours into the flight of Apollo 11, a period of relative quiet. No doubt the Apollo 11 crew quite preoccupied in operation for the activation of the LM. During this period of relative quiet, we'll pass along the heart rates from the LO11 burn, that's LO11, not LO12. We have yet to receive those numbers. The heart rate for the Commander Neil Armstrong read 106, for Command Module Pilot Mike Collins, 66, and for the Lunar Module Pilot Buzz Aldrin we have a reading of 70. At 81 hours, 1 minute into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

PAO Apollo Control, Houston. At 81 hours 5 minutes into the flight. Still a period of relative quiet. Our ground readings indicate that the Apollo 11 spacecraft has completed its program of 52, that's to align the inertial platform. Indications from the ground are that it - this activity went very well. And at 81 hours 6 minutes continuing to monitor, this is Apollo Control, Houston.

PAO This is Apollo Control, Houston, at 81 hours 15 minutes. It's been an extremely quiet pass. No doubt, the Apollo 11 crew, quite busy at this time. We expect, at the time entry is made into the lunar module, Apollo 11, as a matter of fact, will be out of acquisition, traversing over the far side of the moon. At the present time, we read an altitude, current altitude, reading of 56.7 nautical miles. Our ground displays indicate an apolune of 65.4, a perilune of 53.8 and spacecraft velocity of 5,364 feet per second. Continuing to monitor, this is Apollo Control, Houston, at 81 hours 16 minutes into the flight.

CAPCOM Hello Apollo 11, Houston. We're wondering if you started into the LM yet. Over.

SC We have the CSM hatch out, the drogue and probe removed and stowed, and we're just about ready to open the LM hatch now.

CAPCOM Roger. Thank you much, Neil. We'll be standing by.

PAO This is Apollo Control, Houston at 81 hours 24 minutes now into the flight. The silence of conversation between Mission Control Center, Houston and the crew has broken there moments ago. Charlie Duke called up Apollo 11 and spoke with Neil Armstrong, who indicated that the hatch was out and the probe and drogue removed and they were about ready to open the lunar module hatch. Our current altitude shows 54.7 nautical miles, apolune, 65.4, perilune, 53.8. Interestingly enough, the part of the LM activation which we will follow up most closely will be at time of reacquisition following our pass over the far side of the moon. This will be on the front side. It will afford us an opportunity for a communications check with the lunar module and there will be a transfer to LM power. At 81 hours 25 minutes, this is Apollo Control, Houston.

SC Okay, Charlie. We're in the LM. The docking index mark is the same.

CAPCOM Roger, we copy.

PAO You heard that report from Neil Armstrong. They are now in the lunar module.

SC Apparently there just doesn't seem to be any slow way to get that repress to auto without making a big bang.

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 81:02:00, CDT 17:34 251/2

CAPCOM Apollo 11, Houston. Say again.  
Over.

SC Roger. There just doesn't seem  
to be any slow way to get the repress closed to auto and  
avoid a big bang. Over.

CAPCOM We copy, Buzz. Thank you much.  
Out.

CAPCOM We concur with that, Buzz.

END OF TAPE

CAPCOM We concur with that, Buzz.  
CAPCOM Apollo 11, Houston. We'll have LOS  
81:45, next AOS, standby. Next AOS 82:32, over.  
SC Okay, 82:32.  
SC Houston, Apollo 11. I am going to  
start a maneuver to P22 attitude this time.  
CAPCOM 11, roger we copy, over.  
SC Put water inside the command module  
for the first time and a little puddle on the aft bulkhead  
sort of like 101 had.  
CAPCOM Roger.  
SC I'd like to know how EECOM wants to  
get rid of it. There are a number of different ways and  
what does he think is the best one?  
CAPCOM We'll be with you in a moment, Mike.  
Standby.  
SC No big rush. It will wait until the  
next rev or two.  
CAPCOM All right.  
PAO This is Apollo Control, Houston.  
81 hours 30 minutes now into the flight of Apollo 11. The  
Apollo 11 Commander and lunar modules pilots appear to be  
a little bit ahead on their timelines in the LM activation  
period. Meanwhile, command module pilot Mike Collins pro-  
ceeding further with his land mark tracking exercises. Mike  
also reported a little puddle of water inside the command  
module near the aft bulkhead his reference to like 101  
referred to the Apollo 7 spacecraft, which was commanded  
by Walter Schirra. Our current altitude 54 nautical miles,  
current apolune 65.4, our current perilune 53.8. We now  
show a weight in orbit of 70,472 pounds. This is Apollo  
Control, Houston, continuing to monitor at 81 hours 32  
minutes into the flight.  
PAO This is Apollo Control, Houston. We  
are now some five minutes away from loss of signal with the  
Apollo 11 spacecraft. We currently show an altitude of 54.2  
nautical miles, apolune 65.4, perilune 53.9 nautical miles.  
Flight Director Milt Windler now talking with various mem-  
bers of his flight control team. We would expect a final  
bit of conversation prior to loss of signal with the Apollo  
11 spacecraft. We'll keep our line up and continue to monitor  
conversations that could transpire prior to loss of signal.  
Standing by at 81 hours 41 minutes into the flight of Apollo  
11.  
CAPCOM Hello Apollo 11, Houston. We've played  
back the LOI 2 burn. It looks really good to us. The  
systems were all good. We got an orbit on a limited amount  
of tracking. They at 65

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 18:13 GET 81:41 253/1

CAPCOM                    The systems were all good. We got  
an orbit on the limited amount of tracking at 65.4 by a  
53.9. Over.

SC                        Sounds good, Houston.

PAO                       Mark 3 minutes now from predicted  
time of loss of signal.

PAO                       Mark 2 minutes now from time of LOS.

PAO                       Mark 1 minute now from time of LOS.

PAO                       We've now had loss of signal with  
Apollo 11. At 81 hours, 45 minutes into the flight, this  
is Apollo Control, Houston.

END OF TAPE

PAO Apollo Control, Houston. We're now within 2 minutes from time of predicted acquisition of the Apollo 11 spacecraft. As we make this pass - near side pass, on the fourth revolution, it will be the first time that we have transferred during this mission to lunar module pilot power, and a communications check will be performed on the lunar module. We should be hearing such things as long counts being given from the spacecraft. Additionally, a new display - the lunar landing site display is now up for the first time in Mission Control Center this flight. It's essentially a blowup for the landing sites 1 and 2. We expect it to stay up through the time of lunar landing. Meanwhile a Mission Control Center Flight Director, Milt Windler, beginning to discuss with members of his Flight Control team items that might be expected after we acquire. We're less than a minute away at this time - at this time from our forecast acquisition. We'll stand by.

PAO Standing by now for acquisition.

PAO We have acquisition. We are receiving the telemetry data at this time. Hawaii and Goldstone have both acquired.

CAPCOM Hello, Apollo 11, Houston. We're standing by. Out.

SC Okay, Houston. We'll be there. Keep right there just several minutes.

CAPCOM Roger. We copy all that. You're looking good.

PAO That was Mike Collins indicating he would be doing the allude - additional landmark tracking, and we shall hear further from him shortly.

PAO This is Apollo Control, Houston, 82 hours, 38 minutes now into the flight of Apollo 11. Well, we have single contact with Apollo 11 thus far this pass, when Mike Collins identified he was still involved with program 22, the auto optics landmark tracking activity. We expect additional conversation as the pass transpires. Presently we're reading on our orbit displays an altitude of 65.1 nautical miles, apolune 65.3 nautical miles, perilune of 54 nautical miles. We currently show a velocity on the Apollo 11 spacecraft of 5318 feet per second - 5318 feet per second. At 82 hours, 39 minutes, and continuing to monitor, this is Apollo Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 82:40:00, CDT 19:11 255/1

PAO This is Apollo Control, Houston.  
SC Houston, Apollo 11.  
CAPCOM Go ahead.  
SC Roger. You copy that noun 49  
on your downlink. If you've had enough time, I'll proceed.  
CAPCOM We got it. Go ahead, Mike.  
PAO This is Apollo Control, Houston  
at 82 hours 48 minutes now into the flight of Apollo 11.  
Our air-to-ground sounding somewhat noisy, this being because  
we're utilizing the omni antenna for downlink. This, a  
requirement because of the attitude required for landmark  
tracking for program 22. At 82 hours 48 minutes, continuing  
to monitor, this is Apollo Control, Houston.  
CAPCOM Apollo 11, Houston. We see  
a noun 89. You can do the verb 34 now. Over.  
Beat me to it.  
SC Yeah, I've done it. Charlie.  
CAPCOM Rog.  
SC Houston, Apollo 11.  
CAPCOM Go ahead, 11. Over.  
SC All our procedure for P22 seem  
to work very well. The only thing that was a little odd, is  
that there was some dap thruster activity. I had mentioned  
excel command, and roll and yaw and rate command. And somehow,  
roll and yaw got excited and the dap went into a flurry of  
thruster firing. We've noticed the same thing in the CMS,  
and just written it off a CMS peculiarity.  
CAPCOM Roger. We saw that activity,  
Mike. We'll see if we can track it down and let you know.  
Over.  
SC Okay.  
CAPCOM Apollo 11, Houston. You can  
proceed to the sleep attitude now. Over.  
SC That's in work, Houston.  
CAPCOM Okay.  
SC Houston, we're holding initial  
a little while to study the approach for the landing zone.  
CAPCOM Roger.

END OF TAPE

SC - close to the landing zone.  
CAPCOM Roger.  
PAO This is Apollo Control, Houston at 82 hours 55 minutes. Our current spacecraft altitude 62.1 nautical miles. Our orbital parameter is essentially the same at 65.3, 53.9. So at 82 hours 55 minutes, we continue to monitor and this Apollo Control Houston.  
SC Houston, this is Apollo 11. I have a (inaudible) for a landing area.  
CAPCOM Apollo 11, Houston, you are breaking up badly. Say over.  
SC Roger, I can see the primary landing area looking out the LM window, over.  
CAPCOM That's right, over.  
PAO This is Apollo Control, Houston. That was a report from the lunar module pilot Buzz Aldrin. He could see the entire landing area out the window. At 82 hours 58 minutes, this is Apollo Control Houston.  
SC (inaudible)  
CAPCOM Apollo 11, Houston, say again, over.  
CAPCOM Apollo 11, Houston. We got a lot of noise on the down line. Would you please try your high gain in Y sequence and the angles are 180 on the yaw, pitch 0, over.  
SC Houston, Apollo 11, how do you read us on the high gain, over?  
CAPCOM All right, Mike, a lot better now, over.  
SC You want a wide beam for some reason?  
CAPCOM That's affirmative. We got you in the shadows though. You are looking right down along the engine bells towards the Earth so we need you in wide beam over.  
SC Okay, Mike. We're starting our maneuvers in sweep attitude. Roll 82 52 29 yaw 0.  
CAPCOM Roger, the angles you got in the flight plan will be good when you get there.  
PAO This is Apollo Control, Houston, at 83 hours 2 minutes into the flight of Apollo 11. Currently we show an apolune of 65.3 nautical miles, a perilune of 53.9. We would expect the transfer to lunar module power to occur momentarily and from that point on the communications check with the lunar module. 83 hours 3 minutes and standing by, this is Apollo Control, Houston.  
SC Houston, 11.  
CAPCOM Go ahead, 11, over.  
SC Okay, we are on pitch activation 12 13 step 04 and verified defense talkbacks - gray and they're barber pole.  
CAPCOM Roger, standby.  
CAPCOM Apollo 11, Houston, we would like you to take the low voltage DAP. All free system on, over.

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SC Standby, we got it. We just one  
circuit breaker out of position.

CAPCOM Okay.

SC We have a gray now.

CAPCOM Rog.

END OF TAPE

SC Might have them ready now.  
CAPCOM Roger.  
PAO This is Apollo Control, Houston, 83 hours  
7 minutes now into the flight. We're now receiving data from  
the lunar module on our displays here in Mission Control Center.  
CAPCOM Should have warmed up by now.  
COLUMBIA Oh, he's transmitting that B.  
EAGLE Hey, Mike, you transmitting that B?  
EAGLE Houston, Apollo 11, Apollo 11, Eagle. Over.  
CAPCOM Roger, Eagle, this is Houston. We read  
you. Over.  
EAGLE Roger. I read you about 4 by 4. Could  
you give me a short count, please?  
CAPCOM Roger, Eagle. Coming in with the short  
count - 1, 2, 3, 4, 5, 5, 4, 3, 2, 1. Houston out. Over.  
PAO That was Buzz Aldrin from the lunar module  
using the codename for the first time.  
EAGLE REG rate. Over.  
CAPCOM Roger. We got some beautiful data here,  
Eagle. We're - all those guys are looking at it - systems guys.  
We'll have some word for you in a minute how everything looks.  
EAGLE Roger. I'm all ready to switch to high-bit  
rate if that's okay with you.  
CAPCOM Would you please stand by, Eagle. We want  
to get to the proper sleep attitude before we proceed on with  
the COMM's check. Over.  
EAGLE Standing by. Houston, Eagle. Go ahead with  
the camera checkout. It's still on low DAP's and I assume there's  
no problem doing that. Over.  
CAPCOM Stand by.  
CAPCOM That's affirmative. No problem on that,  
Eagle. You can go ahead and power up the sequence camera. Over.  
EAGLE (Garble)  
CAPCOM Eagle, be advised. Sounds like a hot mike.  
Over.  
EAGLE Yes.  
EAGLE Roger. If you're reading me now, I am in  
hot mike because I'm in ICS first to talk, and downvoice backup.  
Over.  
CAPCOM Roger. We just wanted to remind you. Over.  
EAGLE Thank you.  
CAPCOM Columbia, this is Houston. Are you maneuvering  
to sleep attitude? Over.  
CAPCOM Eagle, this is Houston. We have lost all  
the voice and data with Columbia. Would you see if he is maneuvering  
to sleep attitude? Over.  
EAGLE Hey, Mike. You maneuvering to sleep attitude?  
I don't believe they can hear you, Mike. Are you maneuvering to  
sleep attitude?

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EAGLE Houston, Eagle. Columbia has maneuvered to sleep attitude. He's got the high gain antennas - antenna angles set in, and he should be communicating with you. Over.

CAPCOM Roger. We don't have him. Stand by.

CAPCOM Eagle, this is Houston. Would you please have Columbia put in COMMAND RESET? Over.

EAGLE Wilco. COMMAND RESET.

CAPCOM Eagle, Houston. Since we're in sleep attitude, I'll give you another long count. If you're reading in this mode, we'd like you to switch to high bit rate. Over.

END OF TAPE

CAPCOM Now that you're reading in this mode, we'd like you to switch to high bit rate. Over.

SC Roger. Go ahead with your count.

CAPCOM Roger. 1 2 3 4 5 5 4 3 2 1. We're reading you 5 by. You can go to high bit rate now. Over.

SC Roger. Going high bit rate now.

CAPCOM Eagle. This is Houston. Do you read? Over.

EAGLE Houston, this is Eagle, Roger. Read you loud and clear. How do you read? Over.

CAPCOM Roger. Reading you 5 by also, Buzz, and we got the high bit rate. It's looking beautiful for Goldstone. Giving you a count. 1 2 3 4 5. 5 4 3 2 1. Please give us a count. Over.

EAGLE Roger, Houston. Eagle with a count. 1 2 3 4 5. 5 4 3 2 1. Over.

CAPCOM Roger, stand by. We're reading you 5 by, Over.

EAGLE Okay. I'm ready to go S-band first. Over.

CAPCOM Stand by Eagle. Stand by on step 4.

PAO This is Apollo Control, Houston. A voice count exchange between Buzz Aldrin and the Eagle, the Lunar Module and Charles Duke here in Mission Control Center.

CAPCOM Columbia, this is Houston. Would you please give us POO and accept. We've got a load for you. Break. Eagle we're ready to go to step 4. Please select S-band voice to voice. Over.

CAPCOM Hello Eagle, this is Houston. How do you read - normal voice? Over.

EAGLE Eagle - Houston, this is Eagle. Read you loud and clear and S-band, normal voice OMNI. Over.

CAPCOM Roger. you're beautiful in this mode, Buzz, that we're reading you 5 by. Come in with a short count and we'd like one back from you. 1 2 3 4 5. 5 4 3 2 1. Houston out.

EAGLE Houston, Eagle. You're gorgeous also. 1 2 3 4 5. 5 4 3 2 1. Eagle over.

CAPCOM Roger Eagle. This is better than the down voice backup. Stand by 1.

CAPCOM Eagle, Houston. Everybody's happy as a clam with this mode. We'd like to stay here for a little bit. Telemetry looks great and the voice is great. Over.

EAGLE Roger understand. I'm checking

EAGLE out camera number 4 now.  
PAO This is Apollo Control, Houston.  
Our communications check out with the Eagle apparently going very well at this time.  
CAPCOM - here what you're checking out?  
Over.  
EAGLE Roger Houston. Eagle has checked out both 70 millimeter cameras and both 16 millimeter cameras and all work fine. Over.  
CAPCOM Sounds great. Stand by.  
CAPCOM Eagle, Houston. We've looked over your systems on the high bit rate. Everything looks super. We're ready to go. Over.  
EAGLE Roger stand by. You want me to go back to low bit rate now?  
CAPCOM Stand by on that. Over.  
CAPCOM Eagle, Houston. We look good through the 210 on this mode. We're going to shift data select to an 85 foot dish to see what we've got and then we'll be back to you on the 210 if you'll stand by a couple of minutes in this mode, we'll be back with you. Over.  
EAGLE Roger. Eagle standing by.  
PAO This is Apollo Control, Houston.  
83 hours, 21 minutes are now in to the flight. Meanwhile, aboard the Eagle, apparently Buzz Aldrin and Neil Armstrong, although Buzz is doing most of the comm check at this time.  
CAPCOM Eagle, Houston. How do you read?  
Over.  
EAGLE Houston, Eagle. Read you loud and clear. Over.  
CAPCOM Roger. We're reading you 5 by. We've got the voice good through the 85, the telemetry is in and out through the 85. Stand by, we'll be back with you through the 210. Over.  
CAPCOM Eagle, Houston. You can go step 5 now. We'd like low bit rate. Over.  
EAGLE Houston, Eagle. Yes, low bit rate.  
CAPCOM Roger copy, Eagle.  
CAPCOM Eagle, Houston. Could you give me a short count - this mode. Over.  
EAGLE Houston, this is Eagle with a short count. 1 2 3 4 5. 5 4 3 2 1. Eagle over.  
CAPCOM Roger, Eagle. You're 5 by. This S-band voice is really beautiful. Over.  
CAPCOM And Eagle, Houston. We'll be standing by this mode for a minute or so. We'll be back with you if you'll just stand by. Over.  
EAGLE Roger.  
END OF TAPE

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CAPCOM Eagle, this is Houston coming through 210. How do you read? Over.

EAGLE Roger. You're loud and clear.

CAPCOM Eagle, this is Houston. We're happy with all our data and all modes. You can power down to comm now. Over.

EAGLE Roger. I understand. Eagle will power down to comm and we are just approaching 27 volts now. It looks like we won't have to bother with the high dap.

CAPCOM Rog.

EAGLE We're powering down. Out.

CAPCOM Roger. Copy. Out.

CAPCOM Houston, we got a TEI 11 pad for you and an update on the water dump. Over.

EAGLE Stand by 1, Houston. Are you through with the DSKY.

CAPCOM That's affirm. Over.

EAGLE Okay.

PAO This is Apollo Control, Houston. 83 hours and 27 minutes now into the flight of Apollo 11. That last exchange between Charlie Duke, our capsule communicator and Buzz Aldrin, aboard the Eagle, identifying that we're very well satisfied with the communications check on the lunar module and will proceed with powering down the spacecraft. At 83 hours 27 minutes, we now read an altitude of 54.3 nautical miles, a velocity of 5,376 feet per second. This is Apollo Control, Houston.

COLUMBIA Houston, Columbia. Ready to copy TEI 11. Over.

CAPCOM Rog, Columbia. Here we come with the TEI 11. SPS G&N, 37200 minus 060 plus 047. Noun 33, 098, 05, 2422, plus 41448 plus 03719 minus 02422. Roll is NA, pitch 020, the rest of the pad is NA. Set stars are NA. The ullage is 2 quads, correction, 2 jets for 16 seconds. Use Bravo and Delta. In a comment, the undocked present CSM, correction, this is up front. TEI 11 is undocked. Present onboard weight of the CSM is 37200 pounds. About 50 Alpha on your dap. Over.

COLUMBIA Alright. I read back. TEI 11 SPS G&N, 37200 minus 060 plus 047 plus 098, 052422 plus 41448 plus 03719 minus 02422, NA 020, the rest of the pad NA, ullage two jets for 60 seconds, quads B and D. Undock present CSM weight is okay in the dap.

CAPCOM Roger, 11, and we'd like you to do a waste water dump at 84 hours down to 25 percent. Over.

COLUMBIA Roger, I understand. Waste water dump to 25 percent at 84 hours.

CAPCOM Roger. And Mike, we'll have LOS in about 11 minutes at 83:44. AOS is 84:30, and prior

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CAPCOM to - or at LOS, we would like you to go configure the S-band for high gain track to react, high gain beam to narrow, and let's try that to see if we can get an automatic react at the next AOS. Over.

COLUMBIA Good idea.

PAO That was Mike Collins, aboard Columbia, taking down a maneuver pad.

COLUMBIA Rog.

CAPCOM Apollo 11, Houston. Also that water that you got on the APS bulkhead, we - if it's not too much, we just recommend sopping it up and then throwing the sponges away in the waste stowage area. If it's too much, then we recommend using the procedure in the checklist on page F 10-14. Over.

SC Alright. Thank you.

PAO This is Apollo Control, Houston. 83 hours 34 minutes now into the flight of Apollo 11. The lunar module communications has been deactivated. We currently show a velocity of 5,377 feet per second. Our orbital parameters now read 65.1 nautical miles

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 83:35, CDT 20:06, 260/1

PAO We currently show a velocity of 53 hundred and 77 feet per second. Our orbital parameters now read 65.1 nautical miles epilune, 54.2 nautical miles perilune. At 84 hours 35 minutes continuing to follow, this is Apollo Control, Houston.

CAPCOM Apollo 11 Houston, would you have Buzz make sure he gives us the OPS pressure reading before you close up, over.

COLUMBIA Will do.

SC Houston 11, the OPS read 57 50 both bottles.

CAPCOM Roger.

PAO This is Apollo Control, Houston 83 hours 38 minutes. Apollo 11 now on CSM power.

PAO This is Apollo Control, Houston, 83 hours 40 minutes now into the flight of Apollo 11. We're less than 4 minutes away now from time of loss of signal with the Apollo 11 spacecraft. At the present time, our velocity reading, 53 hundred and 75 feet per second. Our total weight in orbit at this time, reading 70 thousand 500 and 2 pounds. Our orbital parameter's epilune is 65.1 nautical miles, perilune 54.2 nautical miles. This is Apollo Control, Houston.

PAO This is Apollo Control, Houston at 83 hours 43 minutes now into the flight of Apollo 11. Less than a minute away from predicted time of loss of signal with the Apollo 11 spacecraft. We expect the next time we acquire Apollo 11, it's crew, Neil Armstrong, Mike Collins, and Buzz Aldrin, will have begun their rest period. And at 83 hours 43 minutes this is Apollo Control, Houston.

END OF TAPE

PAO                      Apollo 11 has passed out of range with the ground, traversing now over the far side of the Moon. During this pass, we had an extremely successful communications checkout with the lunar module using its code name for the first time. Its code name of the Eagle. Buzz Aldrin performed the counting tasks in concert with Charlie Duke, the capsule communicator here on the ground, and at times Buzz's - Buzz's voice, we noted considerable enthusiasm for the way things are going, and at times Charlie Duke shared that enthusiasm and its maiden checkout in communications, the lunar module Eagle, looked good. At 83 hours 45 minutes, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 84 hours and 28 minutes now into the flight of Apollo 11. We're less than 2 minutes away now from our scheduled time of acquisition with Apollo 11. Meanwhile in Mission Control Center, Astronaut Owen Garriott has now replaced Charlie Duke as our Capsule Communicator. We expect that some final advisories will be passed to the Apollo 11 crew, and final report says such as crew status will be received from Neil Armstrong, Mike Collins, and Buzz Aldrin prior to the start of their sleep period. A little over - we're a little over a minute away now from scheduled time of acquisition. We'll continue to keep the line up and continue to monitor. This is Apollo Control, Houston.

PAO Mark 30 seconds now from time of scheduled acquisition.

PAO Mark 20 seconds. 10 seconds. We should be acquiring shortly and we're standing by.

PAO We have data - we've acquired data on Apollo 11.

PAO This is Apollo Control, Houston. Owen Garriott getting ready to place a call.

CAPCOM Over.

SC Houston, Apollo 11.

CAPCOM 11, Houston. Roger. Reading you fine, and it looks like the automatic REACT went very well just because you came around the LM. We have several small items to discuss with you here just before you go to sleep. Over.

SC Go ahead. Over.

CAPCOM Okay, 11. First of all, on our LM systems checks. Everything went fine. I would like to remind you though tomorrow you may see an ascent pressure light when you activate the MC and W. There should be no problem, however. You did note that the AP - OP tank pressure was only reading 111 psi, which is normal at this point, but the below the level which will trigger your light due to the helium which has been dissolved into the propellant. Over.

SC Roger. Understand that. Thank you.

CAPCOM Roger. And next item, the supercritical helium rise rate is nominal, and you also had that question for us about your thruster activity during the P22 on the last REV. Believe we understand that now, and you reported that your pitch was in ACCEL COMMAND and your yaw and roll were in REG COMMAND. You were firing your pitch thrusters that will couple REG into your yaw and roll axes, and the - you were at that time holding only half a degree deadband and coupling REG's into yaw and roll produced the extra firings about the yaw and roll axes. Over.

SC Yes, that may be true. It's very peculiar coupling in that it waits longer than you would think and its

SC reaction is greater than you would think. We were getting yaw rates of around four tenths of a degree per second per panel.

CAPCOM Roger, Mike. We did play the data back and that's the way it looked upon analysis of the chart recordings back here. Over.

SC Okay. Fine.

CAPCOM They've also looked at the results of your landmark tracking. The marks all apparently were very good and we've got a full page of data here relative to the altitudes of the various track locations, which I won't read up to you, but I did want to let you know that the marks apparently went very well. I also have your consumables budget, particularly your RCS propellant quantities. They're Deltas from nominal if you should want them. Your work quad is quad Charlie, which is 9 percent low. I'll not read up the others unless you want them. Over.

SC Okay, I got the O2 fuel cell purge. You want them now?

CAPCOM I'll have to stand by just a moment.

SC Okay. And then the other one is we're still charging battery A.

CAPCOM 11, Houston. We would like to delay the fuel cell purge until the back side of the moon, and you go ahead and - should terminate your battery charge at this time. Over.

SC Okay; understand. I knew we had another O2 and H2 purge coming up in the morning, I wasn't sure whether you wanted to go through with this one or not. I'll wait until the next side and then do it.

CAPCOM That's fine, Buzz.

SC Terminate battery charging now.

CAPCOM That's right and one other systems item here - in order to balance your cryo tanks, would you get your O2 and tank 1 and your H2 tank 2 heaters off. Over.

SC Okay, I have O2 tank heater 1 off, and H2 tank heater 2 off.

CAPCOM That's right, Mike, and we believe you have your quad Bravo and quad Charlie turned off in your DAP at this time, and a 5 degree deadband. We'd prefer a 10 degree deadband for your sleep period overnight here. Over.

SC Okay.

CAPCOM One other item relative to a malfunction procedure. It's unlikely that you'll have to worry about this tomorrow, but in your malfunction list under docking on page F11-9 there is a malfunction procedure for a high O2 flow rate at the top - under tunnel at the top of page 11-9. We would like to have you not use that malfunction procedure should you encounter the high O2 flow rate, and instead

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CAPCOM check back with Houston for a revised procedure should you find that situation. Over.

SC Understand and note has been made in my checklist.

CAPCOM 11, Houston. Roger. That just about takes care of all the items we have here on the ground before time to hit the sack, and I guess you will have a presleep check for us before you go to bed.

SC Roger. We're in the midst of cycling the O2 and H2 fans now.

CAPCOM Roger.

END OF TAPE

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CAPCOM - we'll have a presleep check for us before you go to bed.

SC Rog. We're in the midst of cycling the O2 and H2 fans now.

CAPCOM Roger.

SC And the radiation is as follows:  
CDR 11012 CMP 10013 LMP 09015. Negative medication, over.

CAPCOM Roger, copy 11.

PAO This is Apollo Control, Houston. 84 hours 39 minutes now into the flight. That conversational exchange with Owen Garriott - here in Mission Control Center and principally Buzz Aldrin; however, Mike Collins did talk briefly about Program 22, the landmark tracking activity in which he performed. At 84 hours 40 minutes, this is Apollo Control, Houston.

SC Hey Houston, Apollo 11.

CAPCOM 11, Houston, go ahead.

SC Roger. We're thinking about taking the monocular with us on into the LM. We think it might prove to be of some use, over.

CAPCOM Roger, Buzz. It sounds like a good idea for some of your surveying work there inside the cockpit, over.

SC Okay, you want to run that by with whoever might be concerned.

CAPCOM I sure will.

PAO This is Apollo Control, Houston. 84 hours 44 minutes now into the flight of Apollo 11. Our current spacecraft altitude is now 64.3 nautical miles with an apolune 65.2 nautical miles; perilune 54.4 nautical miles. We show an orbital period of one hour 58 minutes 40 seconds on our displays. Current weight of the spacecraft in orbit 70,502 pounds. At 84 hours 44 minutes, continuing to monitor, this is Apollo Control, Houston.

CAPCOM Apollo 11, Houston. We have apparently lost the high gain lock. We would appreciate if you would give us a help manually so we will try to relock up on the high gain, over.

SC Houston, Apollo 11. (inaudible).

END OF TAPE

SC Houston, Apollo 11. (Garble)  
CAPCOM 11, Houston. Reading you very weak till - find out that noise to complete the full transmission. If you'd give us a hand on a manual relock, we'd appreciate it.

PAO This is Apollo Control, Houston 84 hours, 48 minutes now into the flight. We're receiving noisy data at this time. We've requested Apollo 11 to give us a manual relock. Standing by at 84 hours, 49 minutes this is Apollo Control, Houston.

CAPCOM Apollo 11, Houston. We're still unable to pick you up on the high gain antenna. We request you go to MANUAL from wide beam width. The Pitch and Yaw angles in your checklist. You should be able to find us there. Over.

SC Houston, Apollo 11. How do you read now?

CAPCOM 11, Houston. Loud and clear this time. OMNI.

SC Loud and clear. You faded out on your other transmissions. Over.

CAPCOM Roger. Are you in wide-beam now?

SC Negative, but I've got you locked back on again REACQING now.

CAPCOM Roger. That's all we want. We want to stay in narrow and we're a little puzzled about why we lost you here a few minutes ago. Do you have any ideas?

SC Sure don't. We're showing the background - 15 degrees for the pitch and about 270. That ought to be good and clear.

CAPCOM We concur that. We still don't have any good ideas on why we were lost.

CAPCOM 11, Houston. Would you confirm that we did acquire automatically when you came around the LM for this passage. Over.

SC That's confirmed.

CAPCOM Thank you.

PAO This is Apollo Control, Houston 84 hours, 56 minutes are now in the flight of Apollo 11. Our current apolune 65.1 nautical miles, current perilune 54.3 nautical miles. After receiving some noisy signal, Apollo 11 has locked back on in fine form. That was Buzz Aldrin speaking with Owen Garriott here in the Mission Control Center. I expect we will take a second look at why we had to lock on manually. As we receive any updates on this, we'll pass them along. We now read 84 hours, 57 minutes and this is Apollo Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/19/69, GET 84:58, CDT 21:29 265/1

CAPCOM Apollo 11, Houston, over.

SC Houston, Apollo 11.

CAPCOM Eleven, Houston, on your RCS select switches, we show quad Bravo disabled but quad Charlie only partially disabled. Charlie 3 I believe, is the only one you have selected off, is that correct.

SC Yea Roger, that's correct.

CAPCOM Rog.

PAO This is Apollo Control, Houston at 85 hours 5 minutes now into the flight of Apollo 11. We confirmed from the ground, following that conversation exchange. As was pointed out -

CAPCOM We see them all disabled at this time, thank you.

PAO As was pointed out, quad, RCS quad Charlie is now disabled following that conversational exchange between Owen Garriott and Buzz Aldrin. Buzz, the lunar module pilot apparently, quite obviously still awake. 85 hours 7 minutes now into the flight of Apollo 11 now continuing to monitor, this is Apollo Control, Houston.

CAPCOM Apollo 11, Houston, over.

SC Go ahead Houston.

CAPCOM Eleven, Houston. We're going to try to check out this ability to automatically reacquire on the S-band and what we want to do is to secure our uplink carrier for about 30 seconds, then we will turn it back on and see if the spacecraft equipment will automatically reacquire. So if you do not get a call from us within about 3 minutes, that means we have not been able to reacquire and request your assistance on a manual acquisition, over.

SC Okay, we understand.

CAPCOM Eleven Houston, we also would appreciate if you will note the angles that the antenna tracks through in its attempt to reacquire, over.

SC Roger, we'll do that.

END OF TAPE

CAPCOM 11, Houston. It looks like we're locked back up again with no delay. How does it look on board? Over.

SC Roger. The signal strength dropped very rapidly to zero and the pitch and yaw, in about 3 seconds, moved towards 40 degrees pitch and 240 degrees yaw. Right now, we're setting on about 15 degrees pitch and roll about 265 degrees yaw. So they didn't move very far, oh, about 30 degrees apiece and then they picked right back on up again. Over.

CAPCOM Roger. Some of the luckiest people in the background there. We copied your pitch and yaw angles.

CAPCOM 11, Houston. You give us the location of your pitch and yaw location of your position indicators. Over.

SC Roger. They're in the same position as the antenna right now, about 15 degrees pitch and - No, wait a minute. I got them - got it at about 75 instead of 265.

CAPCOM Okay, thank you.

CAPCOM 11, Houston. We'd like to try the same procedure once more. We'll leave the carrier a little longer and be back up for a call within 4 minutes. Over.

SC Okay.

PAO This is Apollo Control, Houston. At 85 hours 17 minutes now into the flight of Apollo 11. What you heard in the conversation between Owen Garriott and Buzz Aldrin was following a communications check in which we secured the uplink carrier for some 30 seconds and waited to give it a period of time of approximately 3 minutes, to see if the spacecraft would reacquire. We appeared to reacquire in fine form on this first test. We will repeat it - this test a second time, delaying approximately 4 minutes before we place a call to Apollo 11. At 85 hours 17 minutes, we currently read an altitude - spacecraft altitude of 56.1 nautical miles. Present velocity shows 5,367 feet per second. At apolune 65 nautical miles, perilune 54.4 nautical miles. Present weight in orbit remains a static 70,502 pounds. Present time in orbit as shown on our displays, 1 hour 58 minutes 40 seconds. This is Apollo Control, Houston.

CAPCOM 11, Houston. We're locked back up again. Can you give us a report on how the antenna behaves?

SC Roger. It was essentially identical as before. The pitch went to 45, 40 to 45 and then the yaw went to about 255, 245 to 255 and then it rather quickly locked up at 15 degrees pitch and 270 yaw. Over.

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CAPCOM 11, Houston. Roger. Your angles of 45 and 255. Do I understand that as soon as the carrier dropped, it went to these angles, or did it only go to these angles after the uplink carrier was reenabled and the antenna began to reacquire. Over.

SC No. As soon as the carrier dropped off, why it drifted over into those angles and stayed there. Then when it came back up again, why it hunted around for a while, but it didn't get any further off, gradually brought it on in to the angles where it is right now, and they the signal strength, would take several jumps as evidentially it goes from wide to medium to narrow.

CAPCOM 11, Houston. I understand, and on another subject, request you zero your optics for the night. Over.

SC Roger. Zero.

END OF TAPE

PAO This is Apollo Control, Houston, at 85 hours 27 minutes now into the flight of Apollo 11. We've run 2 tests thus far with the S-band antenna which has reacquired nicely on both occasions. While we are standing by for further possible conversations with the crew at this time, we're some 50 minutes from predicted time of loss of signal on Apollo 11. Currently we read an apolune of 65 nautical miles - a perilune of 54.4 nautical miles. This is Apollo Control, Houston.

CAPCOM Apollo 11, Houston. Can you confirm that you have change the fuel O2 cylinder as per flight plan in the last hour, over?

SC John, we're still eating. We're about to do it. We'll let you know.

CAPCOM Roger, 11, and we got about 14 minutes to LOS. AOS is about 86:30, a hour away. We are wondering whether or not you planned to have one up at that time or would ya'll like to be asleep inside the next hour?

SC Somebody will be up.

CAPCOM Roger. The thing that we are still puzzling on is the antenna and if - as long as there will be somebody up, why we would like to have somebody check the automatic REACQ on the next AOS.

SC Okay, we'll do that. We haven't chlorinated the water yet and we haven't changed the lithium hydroxide. We're still finishing up dinner.

CAPCOM Rog, Mike thank you.

PAO This is Apollo Control, Houston, at 85 hours 29 minutes now into the flight. That was Mike Collins reporting to the capsule communicator Owen Garriott that the Apollo 11 crew completing dinner at this time. And earlier perhaps if you listened to the air/ground, you heard some music in the background, soft music which would indicate that the this was being played in concert with their evening meal. When we reacquire, we expect one of the three crew members to still be, at least one to be still awake as we run a further check on our spacecraft antenna. At 85 hours 30 minutes into the flight of Apollo 11, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control, Houston.

CAPCOM Buzz, coming up in 2 minutes now and AOS will be at 86 plus 28 plus 15. Over.

SC We'll see you on the other side.

CAPCOM Roger.

PAO 85 hours 40 minutes at this time. That - perhaps the last conversation we'll have with Apollo 11 until we reacquire. We're now 1 minute, 20 seconds away from loss of signal, continuing to stand by. This is Apollo Control, Houston, at 85 hours, 41 minutes.

PAO This is Apollo Control, Houston. We've had loss of signal as the Apollo 11 spacecraft begins its pass around the far side of the moon at 85 hours, 42 minutes.

END OF TAPE

PAO This is Apollo Control, Houston. We're now less than 2 minutes away from acquisition of signal on Apollo 11 and in Mission Control Center, Houston, we're standing by. Mark 1 minute from predicted acquisition of signal. We should be acquiring. We're standing by.

SC Houston, Apollo 11. Over.

CAPCOM 11, Houston. Loud and clear here, over.

SC Okay, we just appeared to get a solid lock from the last, oh about a minute. The tune-for-max needle has been wandering up and down and the pitch and yaw needles have been wandering around but it appears to have reacquired by itself solidly now. We're just finishing up our fuel cell purge hydrogen on number 3 is the last to go off. They'll be coming off just in a second.

CAPCOM Roger, 11. Apollo 11, Houston. We believe we've tracked down the reacquisition problem we had on the previous rev. It looks like it was a receiver power supply here on the ground and no problems in the spacecraft at all. Over.

SC Okay, glad to hear.

CAPCOM 11, that really winds things up as far as we're concerned on the ground for the evening. We're ready to go to bed and get a little sleep. Over.

SC Yeah, we're about to join you.

CAPCOM Rog.

PAO This is Apollo Control, Houston, 86 hours, 33 minutes. You heard that last exchange. The Mission Control Center has isolated our earlier loss of lock on with the S-Band antenna to a faulty power supply to Goldstone which in turn introduced noisy data causing a ground based receiver to go out of lock. This power supply, a 24 volt one, has already been replaced at Goldstone. In summary, the spacecraft looks good and the difficulty was caused here on the ground. At 86 hours, 34 minutes, we now read our orbit at 64.9 nautical miles apolune, 54.6 nautical miles paralune. This is Apollo Control, Houston. This is Apollo Control, Houston at 86 hours, 52 minutes now into the flight of Apollo 11. Our current altitude on the Apollo 11 spacecraft now reads 64.9 nautical miles. This corresponds with our apolune of 64.9 nautical miles. Our perilune on this pass 54.6 nautical miles. We've had no further conversation with the Apollo 11 crew nor do we expect to do so. We will take the loop down at this time and stand by if any further conversation should develop. At 86 hours, 53 minutes into the flight, this is Apollo Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/19/69 CDT 00:03 GET 87:31 270/1

PAO This is Apollo Control, Houston, at 87 hours, 31 minutes now into the flight of Apollo 11. The Apollo 11 spacecraft continues on it's front side pass above the moon. We're now less than 10 minutes away from loss of signal. The Apollo 11 crew in - currently in their rest period. We've received no indication yet that any of the crew members are actually sleeping, although all three appear to be in a very restful mode. This will be the final sleep period for the crew. Now at the threshold of their prime mission objective for the final sleep period prior to landing on the lunar surface and returning. The next scheduled rest period will in fact take place on the surface of the moon. We are now past mid night Central Daylight Time. It is now July 20., the day scheduled for lunar landing. Our current orbital parameters read apolune 67. - correction 64.7 nautical miles, paralune 54.8 nautical miles., Current spacecraft altitude 54.8 nautical miles. Our time of orbit or little period remains the same 1 hour, 58 minutes, 40 seconds. So at 87 hours, 30 minutes, we will continue to stand by in the event that we have any conversation with the crew. This is Apollo Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 00:12 GET 87:40 271/1

PAO This is Apollo control Houston at 87 hours, 40 minutes now in the flight of Apollo 11. Apollo 11 now less than a minute away from loss of signal as it is due to pass over the far side of the moon and out of range with the mission control center as well as the rest of the world. We've had no further conversations with the crew. All spacecraft systems appear in fine shape. We're now less than 30 seconds away from time of loss of signal and standing by. Mark 10 seconds. We've had loss of signal as Apollo 11 passes over the back of the moon.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 2:10 GET 89:38 272/1

PAO This is Apollo Control, 89 hours 38 minutes ground Elapsed Time. Coming down - actually, we've had loss of signal on this the seventh lunar revolution of Apollo 11. Should have acquisition again at 90 hours 25 minutes through the Honeysuckle Creek, Australia station. The crew has been asleep about 2 hours, a little over 2 hours when the third man finally went to sleep, Mike Collins, after a brief interchange with the Ground. And 3 hours 57 minutes remaining in the sleep period. Cabin pressure now holding at 4.7 pounds per square inch at a temperature of 69 degrees Fahrenheit. Crew heart rates are running in the 40's. Apollo 11 presently in a lunar orbit with a pericyynthion of 55 nautical miles, apocynthion of 64.4 nautical miles. Velocity in lunar orbit, 5363 feet per second. Some 44 minutes 46 seconds until acquisition of signal, as the spacecraft comes around from the far side of the moon on the eighth revolution. And at 89 hours 40 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 GET 91:36 CDT 04:08 273/1

PAO This is Apollo Control 91 hours, 36 minutes ground elapsed time. Less than 1 minute remaining until loss of signal with Apollo 11 as it goes onto the lunar far side in the eighth lunar revolution. Two hours remaining in the crew rest period which means that midway through the next front side pass the crew will be wakened if they're indeed not already awake. Flight Surgeon, Ken Beers, reported just prior to the LOS in a brief exchange here in Mission Control that the crew apparently were all asleep soundly at this time and the Flight Director, Glynn Lunney, asked the spacecraft systems engineers how the spacecraft looked as they approached the LOS point. Coming up on LOS now, mark loss of signal. The spacecraft systems were described by the systems engineers as being looking good. 45 minutes to next - 45 minutes, 28 seconds to next acquisition of signal which will be in ground elapse time 92:23. 92 hours, 23 minutes ground elapse time. And at 91 hours, 37 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo control 93 hours, 29 minutes ground elapsed time. Some 5 minutes away from loss of signal of the Apollo 11 on this revolution. And a wake-up call is expected from the spacecraft communicator Ron Evans here in mission control just prior to the time the spacecraft goes into the - goes over the hill on the lunar far side. Standing by as we wait for him to make his call. Presently, Apollo 11 is in an orbit measuring 64 nautical miles apocynthion, 55.5 nautical miles at pericynthion. Present orbital velocity around the moon, 5370 feet per second. Spacecraft calculated now to weight 70 321 pounds. Still standing by for wake-up call. Standing by for Ron Evans big moment as he makes his call to the spacecraft. As being the sleep watch, his job has been rather easy or at least he hasn't had too much conversation with - here we go.

CAPCOM Apollo 11. Apollo 11. Good morning from the black team.

SC Good morning, Houston.

CAPCOM Good morning. Got about 2 minutes to LOS here, Mike.

SC Oh my, you guys wake up early.

CAPCOM Yes, you're about 2 minutes early on the wake up. Looks like you were really sawing them away.

SC You're right.

CAPCOM 11, Houston. For planning purposes, you can go ahead and take the monocular into the LM with you.

SC Okay. I'll tell them. All CSM systems working.

CAPCOM 11, Houston. Looks like the command module's in good shape. Black team has been watching it real closely for you.

SC We sure appreciate that because I sure haven't.

CAPCOM Say again.

SC Because I sure have not.

CAPCOM Roger.

CAPCOM Apollo 11. Thirty seconds. AOS will be 94 plus 21.

SC 94, 21.

PAO This is Apollo control. We have had loss of signal from Apollo 11 as it went over the hill. Now tracking through the Madrid station during this series of revolutions. Next acquisition as Apollo 11 comes back around the east limb of the moon and the next revolution will be at 94 hours, 21 minutes ground elapsed time. Some 43 minutes now, and at 93 hours, 36 minutes ground elapsed time, this is Apollo control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 6:53, GET 94:21, 275/1

PAO This is Apollo Control. 94 hours, 21 minutes ground elapse time. Should have acquisition of signal as Apollo 11 comes around on the front side of the moon on the 10th revolution. AOS is confirmed. We'll stand by Capcom's call to the crew. We have data coming in now. After having breakfast and getting all squared away after the night's rest period, the crew will have a rather busy day including the first man landing on the moon. Some of the preliminary time's being generated now for maneuvers of the day - will include separation at - a separation burn at 100 hours, 39 minutes, 50 seconds. Here goes the call.

CAPCOM - standing by.

SC Houston, Apollo 11.

CAPCOM Apollo 11, Houston. Go.

SC Roger. How do you read the biomed in the

LMP with the LCG on? Over.

CAPCOM Roger. Stand by 11.

CAPCOM Apollo 11, Houston. We have good data on all 3 crewmen. We'll play that - the commander we do not have yet.

PAO This is Apollo Control following the separation burn at the time of 100 hours, 39 minutes, 50 seconds. The descent orbit insertion burn is now scheduled at 101 hours, 36 minutes, 13.5 seconds. Our descent initiation at 102 hours, 32 minutes, 05.1 seconds. We'll stay up live on the air-ground loop, and continue to monitor any further conversation between spacecraft communicator, Ron Evans, here in mission control and the crew of Apollo 11, which at this time is likely in the middle of their breakfast period.

PAO This is Apollo Control still standing by as the Apollo 11 - about a third of the way through the front side pass on revolution number 10. Still in the midst of their breakfast period. Various console positions are preparing numbers for maneuver times, attitudes, and so on for the day's activities to pass to spacecraft communicator who in turn will pass them up to the crew. Probably during this pass - members of the white team of flight controllers headed up by Eugene Kranz are drifting into the control room now to relieve the night watch - black team headed by Glynn Lunney. Glynn Lunney will hold a brief change of shift press conference in the Apollo news center in MSC after the hand-over is complete. We'll continue to monitor the air-ground circuit for any further transmissions from Apollo 11.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 7:14, GET 94:42 276/1

SC Houston, Apollo 11, you sent up a very good view of the landing site. We can pick out almost all of the features we've identified previously.

CAPCOM 11, Houston, roger, sounds real fine. And 11, I have your maneuver PAD, and consumables update whenever you want them.

SC Stand by a little, please.

CAPCOM Roger, we're standing by. And that's the block data on the maneuver PAD by the way.

SC Houston, Apollo 11, it's a couple of minutes away from this rolling right 40 degrees to roll 122 pitch 29 yaw 0, over.

CAPCOM Apollo 11, Houston, roger, we're standing by.

SC Houston, Apollo 11, ready to copy.

CAPCOM Roger, Apollo 11, Houston. Here's your block data. TEI 30, over.

SC Ready to copy.

CAPCOM SPS G&N 36 639 your NOUN 48 minus 072 plus 051 your NOUN 33 135 24 40 00, NOUN 81 plus 32 178 plus 06 036 minus 01 304, your pitch 064 the rest is NA. Ullage 2 jets 16 second, and it's based on LOI REFSMMAT, over.

SC Roger, TEI 30 SPS G&N 36 639'er, minus 072 plus 051 135 24 4000 plus 32 178 plus 06 036 minus 01 304, pitch 064, 2 jets 16 seconds, LOI rest mat, over.

CAPCOM Apollo 11, Houston, read back correct. Your consumables update -

SC Yeah, go ahead.

CAPCOM Roger, GET 91 plus 30 minus 7 percent, Alpha minus 8, Bravo minus 2.5, Charlie minus 10, Delta minus 6.5. H2 total minus 2 pounds, oxygen total plus 9 pounds, over.

SC Okay, thank you, and onboard we're reading non quad Alpha at 75 percent, Bravo 78, Charlie 78, and Delta 77 percent.

CAPCOM 11, Houston, we copy. Apollo 11, Houston, I have your baseline altitude update now. If Buzz is ready to copy.

SC Go ahead.

CAPCOM Roger, alpha 1 is 500, that's 500 feet above the landing site, over.

SC Okay, alpha 1 is 500 feet above the landing site, thank you.

SC Houston, Apollo 11, our crew status report for sleep, CDR 5.5, CMP 6.0, LMP 5.0, over.

CAPCOM Apollo 11, Houston, roger, we have that now.

END OF TAPE

PAO This is Apollo Control. Still F line with the air-ground circuit on the tenth revolution around the moon. The crew reported that the commander had 5 and a half hours of sleep during the night, command module pilot, 6 hours, lunar module pilot, 5 hours. Now 95 hours and 5 minutes into the mission. Another 27 minutes remaining in this pass. Still loss of signal continuing to monitor air-ground circuit. We'll leave it up live until loss of signal.

CAPCOM Apollo 11, Houston. Over.  
SC Houston, Apollo 11. Go ahead.  
CAPCOM Roger. The Black Bugle just arrived with some morning news briefs if you're ready.  
SC Go ahead.

CAPCOM Roger. Okay. Church services around the world today are mentioning Apollo 11 in their prayers. President Nixon's worship service at the White House is also dedicated to the mission, and our fellow astronaut, Frank Borman, is still in there pitching and will read the passage from Genesis which was read on Apollo 8 last Christmas. The cabinet and members of congress with emphasis on the senate and house space committies have been invited along with a number of other guests. Buzz, your son, Andy, got a tour of MSC yesterday. Your Uncle Bob Moon accompanied him on the visit which included the LRL. Among the -

SC Thank you.  
CAPCOM Roger. Among the large headlines concerning Apollo this morning there's one asking that you watch for a lovely girl with a big rabbit. An ancient legend says a beautiful Chinese girl called Chango has been living there for 4 000 years. It seems she was banished to the moon because she stole the pill for immortality from her husband. You might also look for her companion, a large Chinese rabbit, who is easy to spot since he is only standing on his hind feet in the shade of a cinnamon tree. The name of the rabbit is not recorded.

SC Okay, we'll keep a close eye for the bunny girl.

CAPCOM Roger. You residents of the spacecraft, Columbia, may be interested in knowing that today is Independence day in the country of Columbia. Gloria Dies of the Phillipines was crowned Miss Universe last night. She defeated 60 other girls for the Global beauty title. Miss Dies is 18 with black hair and eyes and measures 34 and 1/2, 23, 34 and 1/2. First runner up was Miss Australia, followed by Miss Israel and Miss Japan. While you're on your way back Tuesday night the Americans and National League allstars will be playing ball in

APOLLO 11 MISSION COMMENTARY, 7-20-69, GET 94:59, CDT 7:31 277/2

CAPCOM Washington. Mel Stottlemire of the Yankees is expected to be the American League's first pitcher. No one is predicting who will be first pitcher for the National League yet. They had 9 on the roster.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 7:51 GET 95:19 278/1

CAPCOM Even though research has certainly paid off the the space program, research doesn't always pay off it seems. The Woodstream Corp., parent company of the Animal Trap Company of America which has made more than a billion wooden spring mouse traps reports that it built a better mousetrap but the world didn't beat a door to its path - didn't beat a path to its door. As a matter of fact, the company had to go back to the old fashioned kind. They said, "We should have spent more time researching housewives and less time researching mice". And the Black Bugle is all completed for the morning.

SC Thank you very much. We appriate the news.

SC Black team, we'll be looking for an interesting day with you all tomorrow.

CAPCOM Roger, we'll be going off here shortly, and we'll pick you up in the morning for sure.

PAO This is Apollo Control, some 9 minutes 27 seconds remaining until loss of signal on this 10th revolution in lunar orbit. The crew is preparing, now that they've finished breakfast and gotten a lot of the other items out of the way such as the crew checklist and sleep status and so on, preparing for manning the LM for the second time and preparing for the day's activities which will culminate in landing this afternoon. Apollo 11 is presently in an orbit with a pericyynthion of 55.7 nautical miles, apocynthion 63.8 nautical miles. Lunar orbit velocity 5368 feet per second. We'll continue to stand by on the air-ground circuit for the remaining 8 minutes of this revolution or until loss of signal. Ground elapsed time now is 95 hours 25 minutes, Apollo Control standing by.

CAPCOM Apollo 11, Houston. 3 minutes to LOS.  
AOS at 96 plus 20.

SC Apollo 11, 9620. Thank you.

PAO This is Apollo Control. We have apparently had loss of signal from the spacecraft. Here in Mission Control we are in the process of changing shifts. Flight Director Gene Kranz and the white team of flight controllers coming on to replace Flight Director Glenn Lunney. The Capsule Communicator on this shift will be Astronaut Charlie Duke. We'll reacquire the spacecraft again in a little over 45 minutes, coming up on the 11th revolution of the Moon. At 95 hours 34 minutes, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 8:10, GET 95:38 279/1

PAO This is Apollo Control at 95 hours, 38 minutes. There will be a change of shift briefing following this shift. We estimate the briefing will begin in about 10 or 15 minutes in the MSC auditorium.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 8:50, GET 96:19, 280/1

PAO This is Apollo Control at 96 hours 19 minutes. We are now less than 1 minute to reacquiring the spacecraft on the 11th revolution of the moon. Flight Director Gene Kranz since taking over the shift has gone around the room, reviewed the situation with all of his flight controllers. We expect when we reacquire, Buzz Aldrin will be in the LM beginning the LM power up and check out. And he will be rejoined in a short while by Neil Armstrong. We'll stand by now for acquisition of signal as the spacecraft comes around the corner.

PAO Network says we have acquired signal, we'll stand by for the call to the crew.

CAPCOM Hello, Columbia, this is Houston, do you read over.

SC (garbled) Eagle, how do you read, over.

CAPCOM Eagle, this is Houston, did you call me, over.

SC Roger, how do you read, over.

CAPCOM Roger, reading you about 35 (garbled) a lot of noise on the loop. We think it's coming in from Columbia, but we can't tell. We're unable to raise voice with him. Would he switch over to high gain, over.

SC Okay, I'll have him go to high gain (garbled) here in the background, and I'm up to the point where I turn on the AUTO switch. Would you recommend I hold off a few minutes or go ahead (garbled), over.

CAPCOM Roger, stand by. Get your high gain to working.

SC Houston.

CAPCOM Eagle, this is Houston, you can turn on the IMU, over.

SC Roger, (garbled).

SC Houston, this is Columbia, over.

CAPCOM Columbia, this is Houston, do you read, over.

CAPCOM Hello, Eagle, this is Houston, we've got the noisy downlink on the down voice backup, would you please turn S-band voice to VOX, over.

CAPCOM Columbia, this is Houston, do you read, over.

SC Houston, Columbia, read you loud and clear, how about me?

CAPCOM Roger, about 3 by. Mike, we've got a lot of noise in the background. It's clearing up now. Eagle, Houston, do you read, over.

SC Houston, Eagle, about four by four, over.

CAPCOM Roger, just getting a voice check. Say the page you're of the activation check list, over.

SC Roger, I'm on page 27, over.  
CAPCOM Roger, understand 27, we copy, out.  
CAPCOM Columbia, this is Houston. Would you please give us P00 in accept, we have a state vector for you, over.  
SC Stand by one.  
SC Houston, Columbia, we have P00 in accept, and how are you reading me now.  
CAPCOM Roger, understand, we have P00 in accept. You're about 3-by in - on the voice, Mike, over.  
SC Okay, you're coming in loud and clear, and I'm - speaking in normal voice. If you've got any switch changes, let me know.  
CAPCOM Roger, we've got the noise somewhere in the system down here, I think. We're working on it. And I've got a 130 landmark update for you, and also a DAP load whenever you're ready to copy, over.  
SC Stand by.  
SC Go ahead with the 130 update.  
CAPCOM Roger, Mike. Coming at you with the 130, T1 is 98 37 35, P2 9'er 8 42 44, 4 miles north, over.  
SC Alright, T1 is 98 37 35, P2 98 42 44, 4 miles north of track, and go ahead with your DAP load.  
CAPCOM Roger, CSM weight 36 651, LM 33 627, pitch trim minus .72, yaw trim plus .51, over.  
SC 36 651, 33 627, minus .72, plus .51, over.  
CAPCOM Those are good readbacks, out.  
SC Houston, Eagle, are you satisfied with the LGC self test, over.  
CAPCOM Roger, understand, you passed the LGC self test, over.  
SC Negative, I was asking you if you were satisfied with it. As far as I can tell it's satisfactory, and also the primary evap flow is actuated to number 1 and 96 05, over.  
CAPCOM Roger, copy on the primary evap, we've got the low bit rate, Buzz, we couldn't see that LGC self test, over.  
SC Okay.  
SC Houston, Columbia, the docking tunnel index angle remains unchanged.  
CAPCOM Roger, copy, out.  
SC Houston, Eagle is going to secondary transmitter-receiver and secondary power amplifier, and I'll check with you in 60 seconds, over.  
CAPCOM Roger, stand by. We're standing by, over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-20-69, GET 96:33, CDT 9:05 281/1

CAPCOM Okay.  
SC Roger, Houston. We are through with the computers. You can go back to block. Over.  
SC Houston, Eagle. On secondary transmitter receiver and power amplifier, how do you read? Over. 1, 2, 3, 4, 5. Over.  
CAPCOM Roger. Reading you 5 by, Buzz. How me? 1, 2, 3, 4, 5, 5, 4, 3, 2, 1. Out.  
SC Roger. About the same as before. Switching back to primary.  
CAPCOM Rog.  
SC Houston, Eagle. Back on primary, and I'm ready to proceed with the steerable antenna activation.  
CAPCOM Roger. We're standing by, Buzz. Go ahead. Over.  
SC And I'll go to biomed left - right momentarily.  
CAPCOM Roger.  
PAO LM communications, engineer reports that we're on the LM steerable antenna. This apparently accounts for the quiet communications we're getting at this point.  
SC Houston, eagle. Got a really nice lock on - lock on on the steerable antenna, and you should be receiving biomed light and PCMI. Over.  
CAPCOM Rog, Eagle. We got you 5 by. It's really beautiful. We've got the high bit rate and the biomed. Out. Eagle, Houston. Do you copy? Over.  
SC Roger, copy.  
CAPCOM You got CMP on IRIG 5 and LMP on IRIG 7.  
SC Houston, Eagle. For your information we're doing a glycol pump check now.  
CAPCOM Roger, copy.  
SC And there's the secondary glycol pump.  
CAPCOM Roger.  
SC And I'm on secondary - number 2 pump right now, and I'll hold you for a couple of seconds and then switch back to number 1.  
CAPCOM Roger.

END OF TAPE

CAPCOM Columbia, Houston. Over.  
COLUMBIA Houston. Go ahead Houston.  
CAPCOM Roger, Columbia. We noticed your  
DAP configuration. We'd like you to turn off B-3 and C-4,  
Mike, and for register 2 in the DAP, we'd like all 1's. Over.  
COLUMBIA B-3 and C-4 are both OFF on panel 8  
and I understand you want - say again what you want on register  
2.  
CAPCOM Roger. In the DAP, we'd like you to  
load all 1's. Over.  
COLUMBIA All right.  
CAPCOM Columbia, Houston. Did you hit the  
command reset around - after LOS on the last pass? Over.  
COLUMBIA That's affirmative. When we were having  
idffucly getting you Charlie, I pushed the command reset to  
make sure I had control of high gain.  
CAPCOM Roger. Thank you much. We're in good  
shape now. Over.  
COLUMBIA Okay.  
EAGLE Houston, Eagle. Can you tell me if you're  
picking up BIOMEDS on the CDR now? Over.  
CAPCOM Stand by.  
CAPCOM Eagle, Houston. We're not getting any  
BIOMEDS on the CDR now. Over.  
EAGLE Roger, understand.  
CAPCOM Eagle, Houston. We got the BIOMED on  
the commander now. Over.  
EAGLE Very good. Thank you.  
EAGLE Houston, Eagle. We're ready for an  
E-Memory dump if you are. Over.  
CAPCOM Roger, we're ready. Go.  
CAPCOM Eagle, this is Houston. We see the  
OPTICS zero switch on. Before you take some marks, don't  
forget to cycle it back OFF and ON, and then ON. Over.  
EAGLE Roger, Houston, Eagle. I wish we had  
one of those OPTICS. I'll tell Mike about it  
CAPCOM Roger. Columbia, excuse me. Sorry  
about that.  
PAO This is Apollo Control. Armstrong is  
now in the lunar module, in Eagle, and the LM activation and  
checkout appears to be going along very well somewhat ahead  
of schedule.  
END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 9:25 GET 96:53 283/1

CAPCOM Eagle, Houston. Could you give us a hack on the time that you switched to LM power and also to verify that we're on glycol pump 1. Over.

EAGLE This is Eagle. We're on pump 1, stand by for the switchover time.

CAPCOM Roger.

EAGLE The switch time to LM power is 95:54:00. Over.

CAPCOM Roger, copy, Neil. Is Buzz back in the Columbia now? Over.

EAGLE Yes, he is.

CAPCOM Roger, thank you.

PAO This is Apollo Control. We have about 33 minutes left in this pass before loss of signal. Neil Armstrong confirmed that the LM power switch occurred at 95 hours 54 minutes, which would have put that activity about 30 minutes ahead of the flight plan's schedule, and that appears to be about the pace that the crew is holding, that Armstrong and Aldrin are holding and getting the LM activated and checked out. At this time Buzz Aldrin has returned to the command and service module where he will be donning his pressure garment and then rejoin Armstrong in Eagle.

EAGLE Hello Columbia, this is Eagle on simplex B. How do you read?

COLUMBIA You are loud and clear in simplex B, Neil.

EAGLE Roger, read you loud and clear.

EAGLE Okay, would you configure for simplex A, please.

COLUMBIA Roger, going to simplex A.

EAGLE Columbia, Eagle. How do you read on VHF A?

COLUMBIA Reading you loud and clear on A.

EAGLE Roger, read you loud and clear.

EAGLE And I'm ready to get a time hack from you. Load the CSM time.

COLUMBIA Okay.

COLUMBIA Do you want the TFM first?

EAGLE Lets get your clock first and then we'll get TFM.

COLUMBIA Okay.

EAGLE Give me a time for load.

COLUMBIA 97:01:30. Correction on that, Neil. 97 - make that 97:03:30.

EAGLE Okay, I have 97:03:30 put in.

COLUMBIA Okay, and you've got about a minute to go.

EAGLE Okay.

COLUMBIA 15 seconds to go. It's in. 5, 4, 3, 2, 1 Mark it. 97:03:30.

EAGLE Got it.

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EAGLE Okay, lets do a 0665 on my mark.  
EAGLE Did you get that, Mike?  
COLUMBIA Standing by for your mark.  
EAGLE Okay, 3, 2, 1, Mark.  
COLUMBIA 97:04:03.86.  
EAGLE Okay, I'm within 3/100th. That's within  
our ability to keep together, I think.  
COLUMBIA Right.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-20-69, GET 94:05, CDT 9:37 284/1

CAPCOM Okay, now you want to give me  
CSM verb 05, noun 01 ENTER?  
SC Okay, I give verb 05, noun 01  
inert. We're on 17 06 ENTER.  
CAPCOM Roger.  
SC Get ready to copy.  
CAPCOM Go ahead.  
SC Roger. Register 1, 5 balls;  
register 2, 20017; register 3, 20616. Over.  
CAPCOM Understand R1, 50's; R2, 20017,  
R3, 20616.  
CAPCOM That's correct. I'm standing  
by configured to record your PCM data. And I'm ready to  
start on a ... time ... course align when you are, and when  
you're ready go min deadband and hold.  
SC Okay, Skipper.  
CAPCOM The minimum deadband attitude,  
hold.  
CAPCOM Okay, now I need your noun 20.  
SC Okay, I got verb 06, noun 20,  
give me a mark on it.  
CAPCOM Okay. Mark.  
SC Ready to 1, plus 11202 plus  
20741 plus 00211. Over.  
CAPCOM Copy, 11202 20741 00211.  
SC That's correct.  
CAPCOM Eagle, Houston. That course  
align looked good to us.  
SC Roger.  
CAPCOM Okay, Mike. Your attitude  
hold's no longer required.  
SC Thank you.  
CAPCOM Okay, Mike. I'd like to copy  
a noun 20 again - 06 noun 20. Be on my mark.  
SC Standing by for your mark.  
CAPCOM 3, 2, 1, stand by. Take it  
again.  
SC Okay.  
CAPCOM 3, 2, 1, MARK.  
SC Okay, I read plus 11154 plus  
20792 plus 00230. Over.  
CAPCOM I get - you get 11154, 20792,  
00230.  
SC That's correct.  
CAPCOM Eagle, Houston. I -  
SC Okay, Houston. Did you copy  
your -  
CAPCOM Eagle, Houston. We have the  
angles. I'll read them back. Over. For the command module,

APOLLO 11 MISSION COMMENTARY, 7-20-69, GET 97:05, CDT 9:37 284/2

CAPCOM 11154, 20792, 00230. For the LM,  
18995, 02852, 35863. Over.

SC That's correct for Eagle and  
Command Module.

CAPCOM

Rog:

SC  
97:14:20.

Did you get the time? We're

CAPCOM

Roger, copy. Eagle, out.

CAPCOM

Columbia and Eagle, LOS for  
both spacecrafts 97:32, AOS 98:18. Houston, out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69, CDT 9:54, GET 97:22, 285/1

CAPCOM Eagle, Houston. We have your gyro  
torquing angles if you're ready to copy. Over.  
EAGLE Roger, we're ready to copy.  
CAPCOM Roger, Eagle. For X, minus 00060, Y  
plus 00620, Z plus 01080. Over.  
EAGLE Understand. X minus 00060, Y plus  
00620, Z plus 01080.  
CAPCOM Roger, Eagle. Good readback. Out.  
EAGLE Houston, this is Eagle. Do you want us  
to go ahead and do a VERB 42 at this time?  
CAPCOM Stand by.  
CAPCOM That's affirmative, Eagle. We'd like  
you to go ahead and fine align. Over.  
EAGLE Okay.  
EAGLE Houston, Eagle. LMP how do you  
read? Over.  
CAPCOM Roger, 5 by 5, Buzz. How me? Over.  
EAGLE Oh, loud and clear. I'm going to be  
going through an ascent battery check. You want to check my  
BIOMEDS briefly? Over.  
CAPCOM Roger. Go ahead.  
CAPCOM Eagle, Houston. We got a good BIOMED  
on you, Buzz. Over.  
EAGLE Okay, let me know where it ought to  
be at this point.  
CAPCOM Roger. You can stay there at that  
point. When we go LOS, we'd like you to go OFF on the BIOMED.  
Over.  
EAGLE Roger.  
EAGLE Do you copy those angles, Houston -  
torquing angles?  
CAPCOM Roger, they're correct. You can torque.  
Over.  
CAPCOM Apollo 11, Houston. We have about 4  
minutes LOS. It makes AOS 98:18. Over.  
EAGLE Eagle, roger.  
COLUMBIA Columbia, roger.  
COLUMBIA Eagle, Columbia.  
EAGLE Columbia, Eagle. Go ahead.  
COLUMBIA Roger, the capture latch is in the  
probe engroved in the drogue. Would you like to check them  
from your side?  
EAGLE Allright. Stand by.  
EAGLE Houston, Eagle. ED battery A is 37.0  
and battery B is 36.9. Over.  
CAPCOM Roger, copy both of those, Buzz. Out.  
CAPCOM Eagle, Houston. We looked at the  
E-Memory. It's GO. Over.  
EAGLE Roger, E-Memory, GO.

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 9:54, GET 97:22, 285/2

EAGLE Mike, the capture latches look good.  
COLUMBIA Thank you.  
CAPCOM Eagle, Houston. We'd like you to go  
to the OMNI antenna and next AOS, we'd like you to be in  
FORWARD. Over.  
EAGLE Roger, going to - which OMNI do you  
want now, AFT?  
CAPCOM Eagle, Houston. We'd like AFT now and  
FORWARD at AOS. Over.  
EAGLE Roger.  
CAPCOM Apollo 11, Houston. 30 seconds to  
LOS. Both spacecraft looking good - going over the hill. Out.  
PAO This is Apollo Control. We've had  
loss of signal now. We'll next acquire the spacecraft in  
about 46 minutes at a ground elapse time of 98 hours, 18 min-  
utes. During that pass, Armstrong and Aldrin in the lunar  
module begin checking out activating the lunar module, and  
they appeared to finish about 30 minutes ahead of the scheduled  
time in the flight plans. They began early and have maintained  
the pace. Both spacecraft looking very good at this time.  
Everything progressing very smoothly. On the next revolution,  
revolution 12, the crew will continue activation and checkout  
of lunar module systems. The following revolution, revolution  
13, they will undock from the command and service module.  
At 97 hours, 33 minutes, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 98 hours, 16 minutes. We are now less than 2 minutes from reacquiring the spacecraft in its 12th revolution of the moon. At this time Armstrong and Aldrin should be completing pressure checks on their spacesuits. Coming up in this revolution, they will be running checks on the guidance platform of their LM guidance system. They will also be running checks on the reaction control system thrusters and their descent propulsion system, as well as the rendezvous radar. We will also be giving them the GO/NO GO for undocking in the following revolution. The checkout and activation up to this point has been moving along very smoothly. All systems performing well and we were ahead of the flight plan at the end of the last revolution. We will stand by now to reacquire the spacecraft. The LM and CSM are still docked and Armstrong and Aldrin within the LM. That will be their home for the next 30 hours or so. Now about 45 seconds from reacquiring. We are now about 15 seconds from reacquisition of Apollo 11. Spacecraft currently in an orbit with an apocynthion of 63 and one-half nautical miles and pericynthian of 55.9, as we are continuing to see the apocynthion drop and pericynthian raise as the orbit becomes more and more circular. We should have acquisition of signals shortly. We will have some noise on the circuits until the LM steerable and the CSM high gain antennas are brought into play. CAPCOM Charlie Duke putting in a call to the crew. We'll continue to stand by.

PAO Charlie Duke asking the crew to verify in the LM that they are on their forward OMNI antenna. We are still awaiting lockup and a stronger signal. We will continue to have noise on the circuit until we get a stronger signal. We do have telemetry data from the spacecraft at this time.

END OF TAPE

COLUMBIA Houston, Columbia, down voice backup  
3.  
CAPCOM Roger, we read you. Columbia did you  
call over?  
COLUMBIA Affirmative, Don, down voice backup,  
how do you read me?  
CAPCOM Roger, better, Mike, we're reading you  
now about 4 by. No voice at all with you earlier. Let's stay  
in this configuration. Eagle, are you in voice mode, over.  
EAGLE Roger, Eagle is in voice mode, how  
do you read, over.  
CAPCOM Roger, you're about 3 by now, Buzz. We're  
satisfied with this COMM configuration, let's stay with where  
we are, over.  
COLUMBIA Houston, Columbia, is on OMNI  
Charlie down voice backup, and if you get a chance would you  
look up the coordinates of 1 30 for me, please. I have been  
conflicting information between my cue card and my flight plan.  
I'd like to know which coordinates you want me to use.  
CAPCOM Roger, stand by.  
CAPCOM Columbia, Houston, we're satisfied  
with what you already have loaded in P22 for these coordinates,  
over.  
COLUMBIA Thank you, Houston.  
CAPCOM Columbia, Houston, the coordinates  
you have loaded in 22 are - we have are site 1 30 prime,  
do you concur, over.  
COLUMBIA No, I have the coordinates loaded on  
the que card which are for crater 1 30.  
CAPCOM Columbia, Houston, we made an error on  
those coordinates. We'd like you to load for latitude in  
a NOUN 89 plus 01 243, longitude over 2 plus 11 844, altitude  
minus 00 146 as shown in the flight plan, over.  
COLUMBIA Okay, Houston.  
CAPCOM Eagle, Houston, could you give us an  
idea where you are in the activation, over.  
EAGLE Roger, we're just sitting around  
waiting for something to do. We need a state vector and a  
REFSMMAT, mat, (garbled). And we need you to watch our (garbled)  
load and (garbled) check, over.  
CAPCOM Roger, Eagle, we'll have the state  
vectors and the REFSMMAT as soon as we get the high gain, over.  
It will be about another 10 minutes or so before we get  
through the P22, and when we maneuver to attitude and get  
the high gain, we'll have the updates for you, over.  
EAGLE Roger, we'll go ahead with the DAP  
throttle check (garble), okay.  
CAPCOM Roger, understand your going to the  
adapt throttle check, that's affirmative.  
PAO This is Apollo Control. We'll continue  
to have rather noisy communications from the spacecraft until  
the orbital navigation is completed. Mike Collins is preparing

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to take marks on a landmark near the prime landing site. This information will be received here in Mission Control and will be used to update the Ground's knowledge of where the spacecraft is, and in turn that information will assist them in setting the precise time for the powered descent. Once the orbital navigation is completed we'll be able to get a high gain antenna and LM steerable antenna lock and we should see some improvement in the communications.

END OF TAPE

EAGLE Houston, Eagle.  
CAPCOM Go ahead, Eagle. Over.  
EAGLE Roger. In the first of - on page 47  
step 1 we had the guidance control in PGNCs and mode control  
PGNCs AUTO and of course the circuit breakers are not in on the  
thrusters yet. So when we started through the DAP and proceeded  
on NOUN 46 and we're looking at NOUN 47 now, so we've got an  
RCS CWA light and we've got 4 out of the 8 other bright  
colored red flags. I think that this is explained  
by the fact that we are in PGNCs and AUTO and unable to fire  
the thrusters. Over.  
CAPCOM Roger, stand by.  
CAPCOM Eagle, Houston. You are correct. The  
lights are there and the flags because we haven't closed the  
breakers yet. Over.  
EAGLE Roger.  
EAGLE And Houston, Eagle. Are you going to  
use the high gain before you can look at our GDA position indica-  
tor?  
CAPCOM Stand by.  
CAPCOM Eagle, Houston. We can see all the  
throttle data.  
EAGLE I can.  
CAPCOM Go ahead. Over.  
EAGLE I could give you high bit rate on the  
OMNI if that would help any.  
CAPCOM Negative, we have all the throttle data  
we need. You can stay low bit rate. You can proceed through  
the BRAVO test, but do not do the gimbal trim, over. Repeat,  
do not do the gimbal trim.  
EAGLE Roger, understand.  
COLUMBIA Boy, you just can't mess with the check  
point (garbled)  
COLUMBIA Auto optics are pointed just a little  
bit north of crater 130.  
CAPCOM Roger, copy, Columbia. Out.  
COLUMBIA (garbled)  
EAGLE Houston, Eagle. We are ready to pressurize  
the RCS. Over.  
CAPCOM Stand by.  
CAPCOM Eagle, Houston. You can go ahead with  
your RCS pressurization, but we would like to hold off on  
the RCS checkout until we get the high bit rate. Over.  
EAGLE Roger.  
CAPCOM And Eagle, Houston. Have you deployed  
the landing gear yet? Over.  
EAGLE That's affirmative. The landing gear  
is out and (garbled)  
CAPCOM Roger.  
COLUMBIA Houston, Columbia. I've completed my  
marks. I've gone XL command in all 3 axis to prevent  
that thruster firing that last time.

APOLLO 11 MISSION COMMENTARY 7/20/69 CED 11:10 GET 98:38 288/2

CAPCOM Roger.

PAO Mike Collins reporting that he has completed the marks for landmark tracking. We also got a report from the LM that they have deployed the landing gear, and that report came at 98 hours 45 minutes.

COLUMBIA Houston, Columbia. Say again on the necessary data on the down link. Let me know and I'll proceed.

CAPCOM Columbia, stand by on the NOUN 49. Over.

COLUMBIA Standing by, Houston.

CAPCOM Columbia, Houston. We got your NOUN 49, you can proceed. Over.

COLUMBIA Roger.

CAPCOM Colum - correction, Eagle, Houston. We see the master arm, you can go ahead and correct. We see the press now. Over.

END OF TAPE

SC Roger. Looks good.  
CAPCOM Roger, Buzz. If you've got - would like, I've got your AGS abort constant. Over.  
SC Ready to copy.  
CAPCOM Roger. For your AGS address 224 plus 60267 225 plus 58148226 plus 70312227 minus 50031. Over.  
SC Roger. 224 plus 60267225 plus 58148226 plus 70312227 minus 50031. Over.  
CAPCOM Roger. Good readback. Out.  
SC Eagle. Columbia, my P22 is complete. I'm continuing this maneuver to AGS cal. attitude.  
CAPCOM Roger, fine. We copy.  
SC Roger.  
CAPCOM Eagle, Columbia, your high gain angles are - corrected Eagle, Houston. Your high gain angles are 165 pitch, yaw 66. Over.  
SC Stand by about another (garbled).  
SC Houston, Eagle. I think I've got you on the high gain antenna now. Roger, out.  
CAPCOM Columbia, Houston. If you go to reacq on the high gain we can acquire you now. Over.  
CAPCOM Eagle, Houston. We got some loads for you if you'll give us POO and data. Over.  
SC You've got POO and data.  
CAPCOM Roger. We've got both of you on the high gains now. It sounds great now. Over.  
SC Copy. Rog.  
CAPCOM Columbia, Houston. I have a sep pad if you're ready to copy. Over.  
SC Stand by one.  
SC Ready to copy.  
CAPCOM Roger, Mike. Sep pad. RCS/G&N noun 47 and noun 48 are N/A, noun 33, 100395000, noun 81 is N/A, roll 000007000. Rest of the pad is N/A.  
SC Sep, RCS/G&N at a (garble) of 13950 roll 0 pitch 007 yaw 0. Over.  
CAPCOM Roger. Good readback.  
SC Houston, Eagle. Are you ready for us to start the RCS checkout now?  
CAPCOM As soon as we finish the uplink. Stand by one. Over.  
SC Okay.  
SC Houston, Columbia. Comment on P22. Worked just fine. The crater I marked on is a small crater down inside crater 130 as described by John Young.  
CAPCOM Rog, we copy. Eagle, Houston. On our load - during our load we had to do a verb 96 to stop integration. We're going to start over again on this load.

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CAPCOM Over.

SC Eagle, rog. And Eagle, here.

I read out address in the AGS 404, 405 and 406, and I had believed that 405 and 406 would both be all zeros, and I would propose maybe that I reset them to zero. I realize that 404 should be a negative number, and it is minus 13495. Over.

CAPCOM Roger. Copy.

CAPCOM Eagle, Houston. Over.

SC Go ahead.

CAPCOM Roger. We've got - the only thing we're missing here is the drift check. After we finish our load, we'd like you to do the drift check with Columbia. Over.

END OF TAPE

CAPCOM Eagle, Houston. The 404, 405, 406 look fine to us. Over.

EAGLE Roger. I am going to be setting up to zero for the undocking. The question is do you want me to reset 404, 405, 406 back to the number that they are now, or can I leave them zero. I intend to set 404 to a minus 13495. Over.

CAPCOM Stand by.

CAPCOM Eagle, Houston. We would like you to zero as call out the timeline all three addresses 404, 405, 406 before undocking. after docking you can load them back to the values that you have right now. Over.

EAGLE Eagle. Roger.

EAGLE Houston, Eagle here. Both RCS helium pressures are reading 2900. Over.

CAPCOM Copy. Out.

CAPCOM Eagle, Houston. Over.

EAGLE Go ahead.

CAPCOM Roger, Buzz. There seems to be some confusion here on 405 and 406. We'd like you to zero them out prior to undocking and after undocking you can - we'd like them still zeroed. Over.

EAGLE Roger. I agree with that. Thank you.

CAPCOM Eagle, Houston. We've got the load in - we have reselected P00, your intergration is going again for you. The computer is yours. We'd like to do the drift check now. Over.

EAGLE Roger. In word. Columbia with flick of the 0620 when you are ready.

COLUMBIA Standing by here, Neil.

EAGLE Okay. 3 - 2 - 1 - MARK

COLUMBIA 358.1.64 020.73 359.54. Over.

EAGLE Copy 358.64020.73 and 359.54.

COLUMBIA That's correct.

CAPCOM Eagle, Houston. We've copied the angles and will readback if you are ready. Over.

EAGLE Go ahead.

CAPCOM Right, Neil.

CAPCOM For Columbia 3586402073 35954.

For Eagle 303742007800053. Over.

EAGLE That's correct and GET 99 hours and 4 minutes even.

CAPCOM Roger. Copy. Out.

CAPCOM Eagle, Houston. Have you initialized the AGS yet? Over.

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EAGLE Negative. I haven't had a state  
vector yet.  
CAPCOM Roger. Buzz, have you done the  
377 yet?  
EAGLE Roger. Standing by for your  
state vector.  
CAPCOM Roger. Stand by.  
CAPCOM Columbia, Houston. We have a  
load for you. Could we have POO and ACCEPT? Over.  
COLUMBIA You got it.  
CAPCOM Roger. Thank you, Mike. And for  
Eagle, we've got a state vector for you. Over.  
EAGLE Roger. Free to copy.  
CAPCOM Roger, Buzz. K factor coming  
at you. 90000015. Over.  
EAGLE Roger. 90000015.  
CAPCOM Roger. That's good. That's a  
good enter there.

END OF TAPE

CAPCOM Eagle, Houston. We recommend the AGS initial - well, we see it coming up on the AGS initialization. Over.

EAGLE Roger.

CAPCOM Eagle, Houston. After the AGS initialization we'll be ready for the RCS checkout.

EAGLE Roger.

CAPCOM Columbia, Houston. We got the load in, you can go back to BLOCK.

COLUMBIA Thank you.

CAPCOM Columbia, Houston. Did you get a copy in the LM data low-bit rate behind the moon? Over.

COLUMBIA That's affirmative.

CAPCOM Roger, stand by.

COLUMBIA Or at least I've configured for it. I'm not sure Eagle sent it or not.

EAGLE No, we did not send V-data. Eagle, over.

CAPCOM Roger, copy.

CAPCOM Eagle, Houston. The alignment in the initialization looked good to us. Over.

EAGLE Roger, thank you.

CAPCOM Apollo 11, Houston. LOS is 99:30, next AOS 100:16. Over.

EAGLE 100:16. Roger.

COLUMBIA Eagle, Columbia. Let me know when you copy your RCS hot fire checks so I can disable my ROLL. (garble).

EAGLE Roger, we're right there now. And we'd like you in CSM in min-deadband and HOLD. Over.

COLUMBIA That's where I am.

EAGLE And Houston, you have high bit-rate with us now I believe. We're ready to proceed with the RCS check.

CAPCOM Roger, Eagle, we're standing by. We're ready. Over.

EAGLE Columbia, we'd like wide-deadband at HOLD. Over.

COLUMBIA Okay, in wide-deadband and HOLD.

COLUMBIA You got it.

COLUMBIA Are you going to do your hot fire now?

EAGLE Roger.

COLUMBIA Okay, I'm disabling my ROLL.

COLUMBIA ROLL is disabled.

EAGLE Roger.

END OF TAPE

PAO This is Apollo Control. We have less than 10 minutes now until loss of signal on the twelfth revolution. Before losing contact with the spacecraft, we'll be passing along a GO-NO/GO decision for undocking. That will occur early on the next revolution just prior to reacquiring the spacecraft. Flight Director, Gene Kranz, is going around the control center talking to his flight controllers. We're viewing status in preparation for making the GO-NO/GO decision for undocking.

COLUMBIA Roger. Would you believe you've got thrusters onboard that vehicle.

EAGLE He called his decision hot fire is complete.

CAPCOM Rog, out.

SC Houston, Eagle. The RCS hotfire is complete. How do you observe it? Over.

CAPCOM Stand by. Eagle, Houston. The RCS hotfire looks super to us. We're all GO.

EAGLE Roger. Mike, would you confirm that thruster B3 and B4 are off. Over. And your radar transponder are off.

COLUMBIA B4 is off B3 is off. Transponder is to heater which is the same as being off, and I've got my roll jets back on now.

EAGLE And you're maneuvering. Right?

COLUMBIA Will be shortly, Neil.

CAPCOM Apollo 11, Houston. We're GO for undocking. Over.

EAGLE Roger. Understand.

COLUMBIA Starting a true maneuver to AGS cal attitude.

SC Houston, Columbia.

CAPCOM Go ahead, Columbia. Over.

SC Roger. There will be no television of the undocking. I have all double windows either bullet heads or cameras, and I'm busy with other things.

CAPCOM We occur. Over.

SC Okay.

CAPCOM And, Eagle, Houston. We'd like you to select AFT omni now. It will be good for both LOS and AOS. Over.

EAGLE Roger. Going to AFT omni.

CAPCOM Apollo 11, Houston. One minute to LOS.

SC Columbia, out.

SC Hello, Columbia. Systems looking good.

PAO This is Apollo Control. We've had loss of signal now. We'll reacquire the spacecraft again on the thirteenth revolution in about 45 minutes. At the



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CAPCOM Hello, Eagle, Houston. We're standing by. Over.

CAPCOM Eagle, Houston. We see you on the steerable. Over.

EAGLE Roger. Eagle. Stand by.

CAPCOM Roger. How does it look?

EAGLE The Eagle has wings.

CAPCOM Roger.

EAGLE Looking good.

CAPCOM Roger, Neil. We got a - if you will give us 2 and data, we got the loads for you.

EAGLE Okay, you've got it. 2 and data.

CAPCOM Roger. Let us know when you are ready to copy. We have a DOI pad, and a PDI pad. Over.

EAGLE You check that tracking light, Mike? Back on? Okay, I'm ready to start my YAW maneuver if it suits you, Mike.

EAGLE Look like you are going to be able to do this without burning thrusters, Mike?

EAGLE Go ahead, Houston, Eagle is ready to copy.

CAPCOM Roger, Eagle. Coming at you with a DOI pad. 101361407 981 minus 00758 plus all balls plus 00098 plus corrections 00572 perigee plus 00085 00764 030000293 986 minus 00759 plus all balls plus 00090 rest of the pad is NA. Stand by on your readback. If you are ready to copy the PDI data, I have it for you. Over.

EAGLE Go ahead.

CAPCOM Understand you are ready to copy the PDI data, Eagle. Over.

EAGLE That's affirmative. Go ahead with the PDI.

CAPCOM Roger. PDI pad, PIG 102330436 0950 minus 00021 182287000 plus 56919, PDI aborts less than 10 minutes. 105123000, PDI abort greater than 10 minutes, 103400000 107113000, no PDI plus 12, 102442700, NOUN 81 plus 01223, minus all balls, plus 01889, 01520 plus 00110, 02250, burn time 046000190 plus 01187 plus all balls plus 01911 NOUN 11 103310700, NOUN 37 105123000. Ready for your readbacks. Over.

CAPCOM Eagle, Houston. We are through with the computer. You can go back to bark. Over.

EAGLE Roger. Back to bark and DOI, 101261407 minus 00758 plus all zeros, plus 00098 00572 plus 0085 00764 030000293 minus 000759 plus all zeros plus 00090. NA. Over.



COLUMBIA Neil, I'm maneuvering in roll.  
EAGLE Roger, I see you.  
EAGLE Houston, Eagle. Are you copying the  
(garbled) large numbers for range and range rate in VERB 83,  
and did you just give us a state vector that changed one of  
the 2 vehicles? Over.  
CAPCOM Roger, Eagle. We gave you a LM state  
vector. We have not changed the CSM state vector, however.  
Over.  
EAGLE Okay, that explains it. Over.  
CAPCOM Columbia, Houston. On my mark 9:30 to  
ignition. Mark, 9:30.  
CAPCOM Eagle, Houston. Would you have Columbia  
go to the high gain, yaw 0, pitch minus 20. Over.  
EAGLE You want him to go to high gain yaw 0?  
Say again the numbers.  
CAPCOM Roger, Neil. Yaw 0, pitch minus 20 high  
gain angles. Over.  
EAGLE Okay, yaw 0, pitch minus 20 on the high  
gain.  
CAPCOM That's affirmative. We've lost all data  
with him.  
EAGLE Columbia?  
EAGLE He says he'll do that as soon as he gets  
around there.  
CAPCOM Roger.  
EAGLE Okay.  
CAPCOM Columbia, Houston. How do you read?  
COLUMBIA I hear you loud and clear, Houston. How  
me?  
CAPCOM Roger, Mike, 5 by. On my mark 7 minutes  
to ignition. Mark 7 minutes.  
COLUMBIA I got you.  
COLUMBIA Everything's looking real good.  
PAO This is Apollo Control. We are now 6 minutes  
8 seconds from ignition and -  
CAPCOM Houston. You are looking good for separa-  
tion. You are GO for separation, Columbia. Over.  
COLUMBIA Columbia, understand.  
COLUMBIA We're really stabilized, Neil. I haven't  
fired a thruster in 5 minutes.  
COLUMBIA I made a small trim maneuver.  
EAGLE Mike, what's going to be your pitch angle  
at SEP?  
COLUMBIA 007 degrees.  
EAGLE Okay.  
COLUMBIA Is that close enough for you or do you  
want it to a couple of decimal places.

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EAGLE No, that's good.  
COLUMBIA I think you've got a fine looking flying  
maching there, Eagle, despite the fact you're upside down.  
EAGLE Somebody's upside down.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 13:09, GET 100:37, 296/1

COLUMBIA Okay Eagle, 1 minute until T. You  
guys take care.  
EAGLE See you later.  
COLUMBIA Houston, Columbia. My DSKY is reading  
4.9, in X, 5.0, make it and EMS 105.4. Over.  
CAPCOM Roger, copy. Columbia, it looks good  
to us. Over.  
CAPCOM Columbia, Houston. We'd like you to  
terminate average G. Over.  
COLUMBIA Roger, in P00.  
PAO This is Apollo Control. That separa-  
tion was performed as scheduled. In the command module, a  
DELTA V of about 2.5 feet per second, which give a separation  
to the 2 vehicles of about 1100 feet at the beginning of the  
descent orbit insertion maneuver.  
EAGLE Going right down U.S. 1, Mike.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 13:19, GET 100:47 297/1

COLUMBIA Eagle, at your convenience, I would like to switch over to VHF ranging marks.

EAGLE Roger. Let's go to VHF ranging now.

COLUMBIA On your MARKS.

COLUMBIA Eagle, Columbia. I am reading you loud and scratchy. Neil is not coming through too well on his box. Could you be quiet for 15 seconds while I get this locked on.

EAGLE Okay.

COLUMBIA I've got a solid lock on a heading (garble) .27 miles.

CAPCOM Eagle, Houston. We've got a state vector for you. We'd like POO and data. Over.

EAGLE You have it.

CAPCOM Thank you, sir.

CAPCOM Columbia, Houston. We have a CSM rescue pad if you are ready to copy. Over.

COLUMBIA Ready to copy.

CAPCOM Thanks, Mike. Phasing PIG 103400000 TPI for PDI less than 10, 105123000, TPI for PDI greater than 10, 107113000. Over.

COLUMBIA Roger. PIG's follow phasing 10340 PDI less than 10 1051230 more than 10 1071130. Over.

CAPCOM Good readback. Out.

CAPCOM Eagle, Houston. When you are ready to copy, I have a lunar surface data pad for you. Over.

EAGLE Roger. Stand by.

CAPCOM We've got the load in, Eagle. You can go back up datalink. Over.

EAGLE Roger.

CAPCOM Columbia, Houston. At your convenience we'd like POO and ACCEPT. We have a couple of state vectors for you. Over.

COLUMBIA Okay. Go into POO and ACCEPT and I just got some unexplained ROLL thruster activity. I may have bumped the hand control.

CAPCOM Roger. We will look at it.

COLUMBIA (Garble)

EAGLE Eagle is ready to copy lunar surface data pad.

CAPCOM Roger, Buzz. Starting with the P2, P2 PIGS 102542900 103515600 106373500 109100000. In the remarks P2 occurs at PDI plus 2126. P3 PIG 104394100 001581500 001585400, NOUN 11 105362300107113000. Ready for your readback. Over.

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 13:19, GET 100:47, 297/2

EAGLE Roger P2 102542900 103515600  
106373500 109100000 P2 is PDI plus 2126 P3 104394100  
001581500 001585400 105362300 107113000. Over.

CAPCOM Roger. Good readback, Eagle.

Out.

COLUMBIA Put your tracking light on, please.

EAGLE It's on, Mike.

COLUMBIA Thank you.

CAPCOM Columbia, Houston. We've got the  
load in. You can go back to block. Over.

COLUMBIA Is that for Columbia.

CAPCOM That's affirmative, Columbia.

COLUMBIA Okay. Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 13:29, GET 100:57 298/1

CAPCOM Mike, you want to gives us a mark  
when you're at 7 miles - I mean 7/10ths of a mile.  
COLUMBIA Will do.  
CAPCOM Okay, we just got 7/10ths on the radar.  
COLUMBIA Mark, I'm oscillating between 69 and  
7/10ths.  
CAPCOM Very good, we got 4200 on the data  
meter.  
COLUMBIA I'm steady on 70 now. I read you  
sort of scratchy, but I read you.  
COLUMBIA Houston, Apollo, or Houston, Columbia,  
over.  
CAPCOM Roger, Columbia, over.  
COLUMBIA Do I still need a DOI P76 pad, and  
a PDI plus 12 P76 pad sometime at your convience.  
CAPCOM Roger, stand by.  
CAPCOM Columbia, Houston. DOI P76 pad, if  
you're ready to copy, over.  
COLUMBIA Ready to copy.  
CAPCOM Roger, Mike. NOUN 80 - correction  
NOUN 84 minus 00 758 plus all zero's plus 00 09 8,  
NOUN 33 101 36 14 00, and stand by for the PDI plus 12.  
COLUMBIA Roger.  
CAPCOM Columbia, Houston, with the PDI  
plus 12 NOUN 84, if you're ready to copy.  
COLUMBIA Ready to copy.  
CAPCOM Roger, NOUN 84 plus 01 223 minus  
all zero's, plus 01 889, NOUN 33 102 44 27 00 PDI plus  
burn time is 046, burn time for DOI is 030. Ready for your  
read back, over.  
COLUMBIA Roger, PDI P76 84 minus 00758 all  
balls plus 00098, at 101 36 1400 plus 01 223 minus all balls  
plus 01 889 102 44 27 00 burn 46 and 30 seconds.  
CAPCOM Roger, one error, Columbia, on the  
TIGN for DOI, seconds was 14 07, over.  
COLUMBIA Roger, 14 07.  
CAPCOM Roger. Columbia, Houston, we'd like  
you to turn off your rotational direct - rotational control  
power direct number 2 off, over.  
COLUMBIA It's off, thank you.  
CAPCOM Columbia, Houston. On those P76's  
a friendly reminder from your Fido, add half the burn time  
to the TIGN, over.  
COLUMBIA Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-20-69, GET 101:07, CDT 13:39 299/1

CAPCOM On those P76's a friendly reminder  
from your FIDO, and half the burn time to the TIG. Over.

COLUMBIA Roger.

PAO This is Apollo Control. We're  
coming up on 15 minutes now until loss of signal with the  
lunar module. Flight Director, Gene Kranz, has - has advised  
his flight controllers to review all their data, take a  
good close look at the spacecraft, and in preparation for  
a GO-NO/GO decision on the descent orbit insertion.

CAPCOM Columbia, Houston. We've lost  
our data with Eagle. Will you please have him select AFT  
omni. Over.

COLUMBIA Eagle, this is Columbia. Houston  
would like you to select AFT omni.

EAGLE Rog. I got it now. Houston,  
you reading Eagle now on AFT omni?

CAPCOM That's affirmative, Eagle. Reading  
you 5 by.

EAGLE Roger.

CAPCOM Columbia, Houston. We'll have  
LOS at 101:28. AOS for you 102:15. Over.

COLUMBIA Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 13:49 GET 101:17 300/1

CAPCOM Eagle, Houston. It appeared to us when you were doing the P52 maneuvering the S-band, the high gain, went into the stop. Verify that both S-band breakers are in. Over.

EAGLE Roger, I think I'd gone up to 90 0 before it went there. The one on this side is in and I'll check the other later.

CAPCOM Okay, thank you, Buzz.

CAPCOM Eagle, Houston, you are GO for DOI. Over.

EAGLE Roger, GO for DOI. Do you have LOS and AOS times?

CAPCOM Roger, for you LOS at 101:28. AOS 102:16. Over.

EAGLE Roger, copy.

CAPCOM And Buzz, our S-band steerable update for you on the angles after AOS 219 and yaw 30. Over.

EAGLE Roger, that's in the flight plan. Thank you.

COLUMBIA Houston, Columbia. How are all the systems looking?

CAPCOM Say again. Over.

COLUMBIA Just wanted to get a systems check from you sometime prior to LOS.

CAPCOM Roger.

EAGLE Houston, Eagle. You can - torquing angles NOUN 93 on 4 zeros and a 3 are minus 00292 plus 00289 minus 00094.

CAPCOM Roger, copy. Stand by.

CAPCOM Roger, Eagle, you can torque it. Over.

EAGLE Roger, copy.

CAPCOM Columbia, Houston. Your systems are looking good going over the hill. Approximately 7 minutes to LOS.

COLUMBIA Thank you.

CAPCOM Eagle, Houston. Flick the biomed to commander. Over.

EAGLE Roger, he's on.

CAPCOM Thank you, sir.

CAPCOM Eagle, Houston. We've lost the high bit rate. Would you please select low bit rate? Over.

EAGLE (garbled)

CAPCOM And Eagle on my mark we'll have 12 minutes to ignition. Over.

EAGLE Roger.

CAPCOM Eagle, Houston. Stand by for my mark. Mark 12 minutes to ignition.

EAGLE We copy.

CAPCOM Columbia, Eagle, Houston. 3 minutes LOS. Both looking good going over the hill.

COLUMBIA Columbia, roger.

EAGLE Eagle rog.

END OF TAPE





PAO This is Apollo Control at 102 hours 12 minutes into the flight of Apollo 11. We're now 2 minutes 53 seconds from reacquiring the spacecraft, 21 minutes 23 seconds from the beginning of the powered descent to the lunar surface. It's grown quite quiet here in Mission Control. A few moments ago Flight Director Gene Kranz requested that everyone sit down, get prepared for events that are coming, and closed with a remark "Good luck to all of you". Here on the front of our display boards we have a number of big plot boards which will be used to keep track of the burn progress. Along the more important of those is one which will show the performance on onboard guidance systems, both the primary and the back up guidance system and compare the guidance systems with the Manned Space Flight Network tracking. These displays, by the time this is all over, will look a great deal like a combination Christmas tree and Fourth of July. We're now 1 minute 39 seconds from reacquiring the command module, Columbia. Acquisition of the lunar module will come a little less than 2 minutes after that. At the time we acquire the LM it should be at an altitude of about 18 nautical miles descending toward the 50 000 foot pericyynthion from which point the powered descent to the lunar surface will be initiated. If for any reason the crew does not like the way things look as they are coming across the pericynthion, simply by not initiating the maneuver they will remain in a safe orbit of 60 miles by 50 000 feet, and if they desired they would be able to attempt the powered descent on the following revolution at a ground elapsed time of about 104 hours 26 minutes. We're now coming up on 30 seconds to acquisition of the command module and we'll stand by for that event.

PAO Now work controller says we have acquisition of signal from the command module.  
CAPCOM Columbia, Houston. We're standing by.  
Over.  
CAPCOM Columbia, Houston. Over.  
COLUMBIA Houston, Columbia. Reading you loud and clear. How me?  
CAPCOM Roger. 5 by, Mike. How did it go? Over.  
COLUMBIA Listen, babe, everything's going just swimmingly. Beautiful.  
CAPCOM Great. We're standing by for Eagle.  
COLUMBIA Okay, he's coming around.  
CAPCOM We copy. Out.  
CAPCOM And Columbia, Houston. We expect to lose your high gain sometime during the powered descent. Over.  
COLUMBIA Columbia. Roger. You don't much care do you.  
CAPCOM No, sir.  
PAO We have acquisition of signal from the LM.

EAGLE Houston, Eagle. How do you read?  
CAPCOM 5 by, Eagle. We're standing by for your  
burn report. Over.  
EAGLE Roger. The burn was on time. The residuals  
before knowing: minus 0.1 minus 0.4 minus 0.1, x and z now  
to zero.  
PAO We're attempting to restore antenna lock  
through the big 210 foot dish at Goldstone. We'll stand by.  
CAPCOM Columbia, Houston. We've lost all data  
with Eagle. Please ask him to reacquire to high gain. Over.  
COLUMBIA Eagle, this is Columbia. Houston would  
like you to reacquire on the high gain antenna.  
COLUMBIA Eagle, did you copy Columbia?  
CAPCOM Eagle, Houston. Did you call?  
EAGLE Eagle, Houston - Houston, Eagle. How do  
you read now?  
CAPCOM Roger. 5 by, Neil. We copied up to the  
AGS residuals. Would you please repeat the AGS residuals in  
the trim - correction - the sun check? Over.  
EAGLE Roger. AGS residuals: minus 0.1, minus  
0.2, minus 0.7, and we used the PGNS Noun 86 for Delta-Vz  
which was 9.5, which is yours which is 9.1, and I believe that  
may explain the difference. Apogee 57.2, perilune 9.1, sun  
check, the 3 mark Noun 20 minus Noun 22, plus 0.19 plus 0.16  
plus 0.11. Over.  
CAPCOM Roger. Copy. Looks great.  
PAO Guidance says we're GO.  
PAO Now 12 minutes, 54 seconds to ignition.  
Gene Kranz just replied his flight controllers were off to  
a good start. Play it cool.  
PAO 12 minutes now until ignition for powered  
descent. Everything still looking very good at this point.  
PAO We presently show the LM at an altitude  
of 12.9 nautical miles and descending.  
EAGLE It's Eagle again. Landing side of the  
high gain. Over.  
COLUMBIA Eagle, this is Columbia. Houston reminds  
me again to request you go to - try the high gain.  
CAPCOM Eagle, Houston. We have you now. How  
do you read? Over.  
EAGLE Loud and clear.  
CAPCOM Roger. We see your Verb 47.  
EAGLE Yes, I know what the problem was there.  
It just started oscillating around in yaw. According to the  
needle we're picking up a little isolation right now, as a  
matter of fact.  
CAPCOM Roger. We'll work on it.  
PAO Aldrin is referring to the LM steerable  
antenna. That comment about the oscillations.

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 14:44 GET 102:12 304/3

EAGLE Horizon checklist right on time.  
CAPCOM Roger.  
EAGLE Did you copy the star - I mean the sun  
check, Charlie?  
CAPCOM That's affirmative. We did, Buzz. Out.  
PAO Eagle is now at 10.7 nautical miles, 7  
minutes 37 seconds from ignition.  
CAPCOM Eagle, Houston. The AGS initialization  
looked good to us. Over.  
EAGLE Roger.  
EAGLE Our radar check indicates 50 000 foot  
build in our visual altitude checks. It's 80 and out about  
53 000.  
CAPCOM Roger, copy.  
EAGLE And, Houston, we got a 500 alarm early in  
the program. Went to descent 1, proceeded on it and we're back  
at AUTO again. Over.  
CAPCOM Roger. We saw that, Buzz. Thank you much.  
Out.  
EAGLE Alright. I think in - okay, that wasn't  
an alarm. That was a code. Okay.  
CAPCOM Roger. We saw that.  
CAPCOM Eagle, Houston. We recommend if you yaw  
10 right, it will help us on the high gain signal strength. Over.  
PAO Coming up on 5 minutes to ignition. Gene  
Kranz getting a GO/NO GO for descent.  
CAPCOM Eagle, Houston. If you read, you're a GO  
for powered descent. Over.  
COLUMBIA Eagle, this is Columbia. They just gave  
you a GO for powered descent.  
CAPCOM Columbia, Houston. We've lost them on the  
high gain again. Would you please - we recommend they yaw  
right 10 degrees and reacquire.  
COLUMBIA Eagle, this is Columbia. You're GO for  
a PDI and they recommend you yaw right 10 degrees and try the  
high gain again.  
COLUMBIA Eagle, you read Columbia?  
EAGLE Roger, read you.  
COLUMBIA Okay.  
CAPCOM Eagle, Houston. We read you now. You're  
go for PDI. Over.  
EAGLE Roger. Understand. Elevate the GO circuit  
breaker. Second gimbal AC, closed. Second gimbal AC closed?  
Circuit breaker And override off. Gimbal enable. 8 scale 45.  
CAPCOM Eagle, Houston. You're alignment is GO on  
the AGS. On my mark, 3:30 until ignition.  
EAGLE Roger.  
CAPCOM Mark, 3:30 until ignition.  
EAGLE Roger. Copy. Our translation force is -

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 14:44 GET 102:12 304/4

EAGLE Balanced couple ON, TA throttle, MINIMUM, throttle, AUTO, CDR, STOP BUTTON, RESET, STOP BUTTON, Check ABORT-ABORT STAGE RESET, ATT. CONTROL, 3 of them to MODE CONTROL, PGNS MODE CONTROL is SET, AGS is reading 400 plus 1, standing by for arming.

PAO Buzz Aldrin reading off the checklist there to Neil Armstrong.

EAGLE Hit VERB 77. Okay, sequence camera coming on.

CAPCOM Eagle, Houston. If you'd like to try high gain pitch 212, yaw 37. Over.

EAGLE Roger. I think I've got you on high gain now.

CAPCOM Roger.

PAO Coming up on 1 minute to ignition.

EAGLE Say again the angles. Over.

CAPCOM Roger.

EAGLE We put them in to use them before we yaw around.

CAPCOM Roger. Pitch -

END OF TAPE

EAGLE \_ angle bolt, let them in to use  
them before we go around.  
CAPCOM Roger. PITCH 212, YAW plus 37.  
EAGLE Copy. Over.  
PAO Current altitude about 46 000 feet,  
continuing to descend.  
EAGLE AGS on. (Garble) ten percent  
CAPCOM Columbia, Houston, we lost em  
tell em to go aft OMNI. Over.  
EAGLE (Garble)  
COLUMBIA Say again, Neil.  
EAGLE I'll leave it in SLEW. See if  
they have got me now. I've got good signal strength in  
SLEW.  
COLUMBIA See if you're getting them now, Houston.  
CAPCOM Eagle, we've got you now. It's  
looking good. Over.  
EAGLE You think that looks good?  
capcom Eagle, Houston. Everything is  
looking good here. Over.  
EAGLE Roger. Copy.  
CAPCOM Eagle, Houston. Aft Yaw  
around angles S-band PITCH minus 9 YAW plus 18.  
EAGLE Copy.  
EAGLE AGS and PNGS agree very closely.  
CAPCOM Roger.  
EAGLE Rate on. Altitudes are a bit high.  
PAO 2 minutes, 20 seconds everything  
looking good. We show altitude about 47 000 feet.  
EAGLE Houston. I'm getting a little  
fluctuation in the AC voltage now.  
CAPCOM Roger.  
EAGLE Could be our meter, maybe huh?  
CAPCOM Stand by. Looking good to us.  
You're still looking good at 3, coming up 3 minutes.  
EAGLE (Garble) Looks real good. (Garble).  
Our positions check downrange here seems to be  
a little long.  
CAPCOM Roger. Copy.  
EAGLE Altitude rate about 2 feet per second  
greater than it ought to be. (Garble).  
EAGLE Altitude (Garble)  
I think it's gonna drop.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 102:38, CDT 15:10 306/1

CAPCOM I think it's going to stop.  
CAPCOM Eagle, Houston. You are go.  
Take it all at 4 minutes. Roger, you are go - you are go to  
continue power descent. You are go to continue power descent.  
EAGLE Roger.  
PAO Altitude 40,000.  
CAPCOM And Eagle, Houston. We've got data  
dropout. You're still looking good.  
EAGLE PGNCS we go good lock on. Altitude  
lights out. Delta H is minus 2 900.  
CAPCOM Roger. We copy.  
EAGLE And the earth right out our front  
window.  
EAGLE Houston, you're looking at our Delta H.  
Program alarm.  
CAPCOM That's affirmative. It's looking good  
to us. Over.  
EAGLE 12 02, 12 02.  
PAO Good radar data. Altitude now  
33 500 feet.  
EAGLE Give us the reading on the 12 02  
program alarm.  
CAPCOM Roger. We got - we're go on that alarm.  
EAGLE Roger. P30.  
CAPCOM 6 plus 25 throttle down.  
SC Roger, copy. 6 plus 25.  
PAO We're still GO. Altitude 27 000 feet.  
EAGLE Alarm. It appears to come up at  
16 68 up.  
CAPCOM Roger, copy. Eagle, Houston. We'll  
monitor your Delta-H.  
EAGLE Delta-H is looking good now.  
CAPCOM Roger, Delta-H is looking good to us.  
Right on time.  
EAGLE Throttle down better than in the simula-  
tor.  
CAPCOM Rog.  
EAGLE AGS and PGNCS look real close.  
PAO Altitude now 21 thousand feet. Still  
looking very good. Velocity down now to 12 hundred feet per  
second.  
CAPCOM You're looking great to us, Eagle.  
EAGLE Okay, I'm still on slough so we may  
tend to loose as we gradually pitch over. Let me try auto  
again now and see what happens.  
capcom Roger.  
EAGLE Okay, looks like it's holding.  
CAPCOM Roger, we got good data.

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 102:38, CDT 15:10, 306/2

PAO Seven minutes 30 seconds into  
the burn. Altitude 16 thousand 3 hundred feet.  
CAPCOM Eagle, Houston, it's descent  
2 fuel to monitor, over.  
EAGLE 72.  
PAO Altitude 13 thousand 5, velocity  
91 hundred feet per second.  
EAGLE Made it switch over time  
please, Houston.  
CAPCOM Roger, stand by, you're looking  
great at 8 minutes.  
PAO Correction on that velocity,  
now reading 760 feet per second.  
CAPCOM It's the P64.  
EAGLE Good, Roger.  
PAO FIDO says we're go, altitude  
92 hundred feet.  
CAPCOM 8 30 you're looking great.  
PAO Descent rate 129 feet per second.  
CAPCOM We copy.  
CAPCOM Eagle you're looking great, coming  
up 9 minutes.  
PAO We're now in the approach phase  
of it, looking good. Altitude 52 hundred feet.  
EAGLE Manual auto attitude control  
is good.  
CAPCOM Roger, copy.  
PAO Altitude 42 hundred -

END OF TAPE

CAPCOM Roger, copy.  
 PAO Altitude 4200.  
 CAPCOM Houston. You're go for landing. Over.  
 EAGLE Roger, understand. Go for landing.  
 3000 feet.  
 CAPCOM Copy.  
 EAGLE 12 alarm. 1201.  
 EAGLE 1201.  
 CAPCOM Roger. 1201 alarm.  
 EAGLE We're go. Hang tight. We're go.  
 2,000 feet. 2,000 feet into the AGS. 47 degrees.  
 CAPCOM Roger.  
 EAGLE 47 degrees.  
 CAPCOM Eagle looking great. You're go.  
 PAO Altitude 1600. 1400 feet. Still looking  
 very good.  
 CAPCOM Roger. 1202. We copy it.  
 EAGLE 35 degrees. 35 degrees. 750, coming down  
 at 23. 700 feet, 21 down. 33 degrees. 600 feet, down at 19.  
 540 feet, down at 30 - down at 15. 400 feet, down at 9. (garbled)  
 8 forward. 350, down at 4. 330, 3-1/2 down. We're pegged on  
 horizontal velocity. 300 feet, down 3-1/2. 47 forward.  
 (garbled) Down 1 a minute. 1-1/2 down. 70. Got the shadow  
 out there. 50, down at 2-1/2. 19 forward. Altitude-velocity  
 lights. 3-1/2 down, 220 feet. 13 forward. 11 forward, coming  
 down nicely. 200 feet, 4-1/2 down. 5-1/2 down. 160, 6-1/2  
 down, 5-1/2 down, 9 forward. 5 percent. Quantity light. 75  
 feet, things looking good. Down a half. 6 forward.  
 CAPCOM 60 seconds.  
 EAGLE Lights on. Down 2-1/2. Forward. Forward.  
 Good. 40 feet, down 2-1/2. Picking up some dust. 30 feet,  
 2-1/2 down. Faint shadow. 4 forward. 4 forward, drifting to  
 the right a little. 6 (garbled) down a half.  
 CAPCOM 30 seconds.  
 EAGLE (garbled) forward. Drifting right.  
 (garbled) Contact light. Okay, engine stop. ACA out of  
 detent. Modes control both auto, descent engine command  
 override, off. Engine arm, off. 413 is in.  
 CAPCOM We copy you down, Eagle.  
 EAGLE (Armstrong) Houston, Tranquility base  
 here. The Eagle has landed.  
 CAPCOM Roger, Tranquility, we copy you on  
 the ground. You've got a bunch of guys about to turn blue.  
 We're breathing again. Thanks a lot.

TRANQUILITY Thank you.  
 CAPCOM You're looking good here.  
 TRANQUILITY I tell you. We're going to be busy  
 for a minute. Master arm on. Take care of the descent.  
 (garbled) Very smooth touchdown. Looks like we're venting  
 the oxidizer now.  
 CAPCOM Roger, Eagle. And you are stay for  
 T1. Over. Eagle, you are stay for T1.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 15:20, GET 102:48, 308/1

CAPCOM Roger, Eagle, and you're stay. Press  
E 1, over. Eagle, you are stay for T1.  
EAGLE Roger, and we're stay for T1.  
CAPCOM Roger, and we see you getting the OX.  
EAGLE Roger.  
EAGLE And our circuit breaker.  
EAGLE - copy NOUN 60 - NOUN 43, over.  
CAPCOM Roger, we have it.  
COLUMBIA Houston, do you read Columbia on the  
high gain?  
CAPCOM Roger, we read you 5 by, Columbia.  
He has landed, Tranquility base. Eagle is at Tranquility,  
over.  
COLUMBIA Yeah, I heard the whole thing.  
CAPCOM Rog, good show.  
COLUMBIA Fantastic.  
CAPCOM (garble)  
PAO The next major stay, no stay will be for  
a T2 event, that is. at 21 minutes 26 seconds after initiation  
for power descent.  
COLUMBIA Columbia set up telemetry command reset  
to reacquire on the high gain.  
CAPCOM Copy, out.  
PAO We have an unofficial time for that  
touchdown of a 102 hours 45 minutes 42 seconds and we will  
update that.  
CAPCOM Eagle, Houston. You loaded R2 wrong.  
We want 10254.  
EAGLE Roger.  
EAGLE That is V horizontal 5515.2.  
CAPCOM That's affirmative.  
PAO We are now less than 4 minutes from  
our next stay, no stay. The stay will be for 1 complete  
revolution of the command module.  
EAGLE Mike, AGGS the things align, over?  
CAPCOM Say again.  
EAGLE Mike, the AGGS the things align, over.  
CAPCOM Roger, we are standing by for it.  
PAO One of the first things that Armstrong  
and Alden will do after getting their next stay, no stay will  
be to remove their helmet and gloves.  
EAGLE Our quantity, (garble).  
CAPCOM Eagle, Houston. You are stay for T2,  
over.  
CAPCOM A correction, your -  
EAGLE Have your stay for T2, we thank you.  
CAPCOM Roger, sir.  
PAO That stay for another 2 minutes plus.  
The next stay no stay will be for 1 revolution.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69, GET 102:53, CDT 15:25, 309/1

PAO steady for another 2 minutes plus, the next stay no stay, will be for 1 revolution. We don't expect much in the way of a visual description of the landing area from the crew until after we get through these critical stay, no stay periods and have gotten the status to remain on the lunar surface for at least 1 command and service module revolution. All spacecraft systems continue to look good to us here on the ground.

EAGLE Tranquility base, Houston, we recommend you exit P12, over.

EAGLE Houston, that may have seemed like a very long final phase. The auto targeting was taking us right into a football field, football field sized crater, with a large number of big boulders and rocks for about 1 or 2 crater diameters around us, and it required a (garbled) on the 366 and flying manually over the rock field to find a reasonably good area.

CAPCOM Roger, we copy. It was beautiful from here, tranquility, over.

EAGLE We'll get to the details of what's around here, but it looks like a collection of just about every variety of shapes, angularities, granularities, every variety of rock you could find. The colors vary pretty much depending on how you're looking relative to the 0 phase point. There doesn't appear to be too much of a general color at all, however it looks as though some of the rocks and boulders, of which there are quite a few in the near area, it looks as though there going to have some interesting colors to them, over.

CAPCOM Roger, copy. Sounds good to us tranquility. We'll let you press on through the simulated count down, and we'll talk to you later, over.

EAGLE Roger.

EAGLE Okay, this 16G is just like the airplane.

CAPCOM Rog, tranquility, be advised there's lots of smiling faces in this room, and all over the world.

END OF TAPE

EAGLE - yeah, just like an airplane.  
CAPCOM Rog, Tranquility - be advised that there is a lot of smiling faces in this room and all over the world, over.  
EAGLE There is 2 of them up here.  
CAPCOM Rog, that was a beautiful job, you guys.  
COLUMBIA And don't forget one in the command module.  
CAPCOM Rog.  
PAO That last remark from Mike Collins at an altitude of 60 miles. The comments on the landing on the manual take-over came from Neil Armstrong. Buzz Aldrin followed that with a description of the lunar surface and the rocks and boulders that they are able to see out the window of the LM.  
CAPCOM Tranquility, Houston. We had you pitch up about 4 and 1/2 degrees, over.  
EAGLE That's confirmed by our local observation.  
CAPCOM Roger.  
COLUMBIA And thanks for putting me on relay, Houston. I was missing all the action.  
CAPCOM Roger, we'll enable this in relay.  
COLUMBIA I just got it, Larry.  
CAPCOM Rog, Columbia. This is Houston. Say something they should be able to hear something, over.  
COLUMBIA Roger, Tranquility base. It sure sounded great from up here. You guys did a fantastic job.  
EAGLE Thank you. Just keep that orbiting base ready for us up there now. (garble)  
COLUMBIA Will do.  
PAO That request from Neil Armstrong.  
PAO Here in Mission Control, Flight Director Gene Kranz is going around the -  
EAGLE We have 10327, AOS 10413, over.  
COLUMBIA Thank you.  
PAO We have just gotten a report from the TEL COM here in Mission Control that the LM systems looked good after that landing. We're about 26 minutes now from loss of signal from the command module.  
CAPCOM Tranquility base, Houston. All of your consumables are solid. You are looking good in every respect. We copy the dips of any. Everything is copagetic, over.  
EAGLE Thank you, Houston.  
EAGLE Houston, the guys had said we wouldn't be able to tell precisely where we are or the winners today -

END OF TAPE

EAGLES The Czar has said that we wouldn't be able to tell precisely where we are the winners today. We were a little busy, worrying about program alarms and things like that. Part of the descent where we would normally be picking out our landing spot and aside from a good look at several of the craters we seen over in the final descent, I haven't been able to pick out the things on the horizons. I haven't had the reference as yet.

CAPCOM Roger Tranquility. No sweat. We'll figure it out. Over.

EAGLE You might be interested to know that I don't think I noticed any difficulty at all in adapting to 1/6g. At least, immediately natural to move in in this environment.

CAPCOM Roger Tranquility. We copy. Over.  
PAO Neil Armstrong reporting there. No difficulty adapting to the one-sixth gravity of the moon.

EAGLE Window is a relatively level plain crated with a fairly large number of craters of the five to fifty foot radi and from ridges small 20, 30 feet high I would guess and literally thousands of little one and two foot craters around the area. We see some angular blocks out several hundred feet in front of us that are probably 2 feet in size and have angular edges. There is a hill in view, just about on the ground track ahead of us, difficult to estimate but might be a half a mile or a mile.

CAPCOM Roger Tranquility. We copy. Over.  
COLUMBIA Sounds like it looks a lot better now than it did yesterday at that very low sun angle. It looked rough as a cob then.

EAGLE It was really rough Mike over the targeted landing area but it was extremely rough cratered and large numbers of rocks that were probably some, many larger than five or ten feet in size.

COLUMBIA Laying down - land long.

EAGLE So we did.

CAPCOM Tranquility, Houston. After you get through this P57, we'd like to E-Memory dump. Over.

TRANQUILITY Roger after this first P57 you want a E-Memory dump?

CAPCOM That's affirmative.

CAPCOM Columbia, Houston. We have a P22 update for you, if you're ready to copy. Over.

COLUMBIA At your service sir.

CAPCOM Roger Mike. T1 1043218 T21043728 and that is 4 miles south. This is based on a targeted at landing site. Over.

COLUMBIA                    Then Roger understand based on  
a targeted landing site T1 104 at 3218 T2 1043728 and  
4 miles south.

CAPCOM                    Roger.

COLUMBIA                    Do you have any idea where they  
landed left or right of centerline; just a little bit long.  
Is that all we know?

CAPCOM                    Apparently that's about all we  
can tell. Over.

COLUMBIA                    Okay. Thank you.

CAPCOM                    Tranquility, Houston.

TRANQUILITY                Houston, our mission timer is  
now reading 9023447 and static.

CAPCOM                    Roger. Copy your mission timer's  
now static. Say again the time.

TRANQUILITY                9023447.

CAPCOM                    Roger copy Tranquility. That  
gravity align looks so good, we see you recycling.

TRANQUILITY                Well, no. I was trying to get time,  
16 65 out and somehow it was beated on to the 622 before  
I could do a VERB 32 enter. I want to log the time here  
and then I'd like to know whether you want me to proceed  
on the torquing angles or go back and reenter again before  
torquing. Over.

CAPCOM                    Roger Buzz. Stand by.

CAPCOM                    Tranquility, Houston. We'd like  
you to recall P57 and run through the gravity align one  
more time. Over.

TRANQUILITY                Roger. I concur with that.

CAPCOM                    And Roger Tranquility, for your  
mission timer, two suggestions. Set the circuit breaker  
panel 11 also reset and attempt to start. That man in  
the first digit might have something to do with it. Over.

TRANQUILITY                Okay. Retried both of those. The  
circuit breaker is in when I reset the - put it in reset,  
I get 9020440 when I release it, now I get 9020449. I'm  
going to cycle the circuit breaker.

CAPCOM                    Roger.

TRANQUILITY                I cycled the circuit breaker and  
got all nines and right now reset for all nines.

CAPCOM                    Roger.

CAPCOM                    Tranquility, Houston. We'll  
research this problem and be back with you momentarily on  
the mission event - correction the mission timer.

TRANQUILITY                Okay.

END OF TAPE

EAGLE I'd say the color or the, the local surface is very comparable to what we observed from orbit at this sun angle, about 10 degrees sun angle, or that nature, it's pretty much without color. It's gray and it's a very white, chalky gray, as you look into the zero phase line and it's considerably darker gray, more like ash ashen gray as you look up 90 degrees to the sun. The, some of the surface rocks in close here that have been fractured or disturbed by the rocket engine are coated with this light gray on the outside but when they've been broken they display a dark, very dark gray interior and it looks like it could be country basalt.

CAPCOM Roger. Tranquility, we see the noun 93, verb 34.

EAGLE Roger, I assume you wanted it, roger.

CAPCOM Tranquility, Houston, please vent fuel and ox again, over, it's building back up.

EAGLE Okay, ox going now.

CAPCOM Tranquility, Houston, you can open both fuel and ox vent now, over.

EAGLE Okay.

EAGLE Houston, tranquility, standing by for go on AGS to PNGCS aligned and a lunar align, over.

CAPCOM Stand by.

CAPCOM Tranquility, Houston, you are go for the AGS to PNGCS align, and then the lunar align, over.

EAGLE Roger.

CAPCOM Tranquility, Houston, please vent the fuel, it's increasing rapidly, over.

EAGLE We show 30 PSI in the fuel and 30 in the oxidizer.

CAPCOM Roger, we're reading somewhat different than that, stand by.

EAGLE The fuel temperature is reading 64 in the descent and the oxidizer, descent 2 and the oxidizer is off scale low. Descent 1 is showing 61 in the fuel and 65 in the oxidizer.

CAPCOM Roger, stand by. Tranquility Houston, please take the fuel vent switch and hold it open, over.

EAGLE Okay, we're holding it open, indicating about 24 PSI onboard.

CAPCOM Roger.

EAGLE Now indicating 20 PSI in the fuel side.

CAPCOM Roger.

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 103:13, CDT 15:45, 312/2

EAGLE And 22 in the ox.  
CAPCOM Roger.  
EAGLE Now indicating 15 PSI and no  
tanks.  
CAPCOM Roger.  
CAPCOM Tranquility, Houston. If you  
haven't done so you can release the fuel vent switch now,  
over.  
EAGLE Roger.  
CAPCOM Tranquility, Houston. We have  
indication that we've frozen up the descent fuel helium heat  
exchanger and there's some fuel trapped in the line between  
air and the valves and the pressure we're looking at is increasing  
there, over.  
EAGLE Roger, understand.  
CAPCOM Tranquility base, Houston. If  
you have not done so please close both fuel and ox vents now,  
over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 103:23, CDT 15:55 313/1

CAPCOM Houston. If you have not done so, please close both fuel and ox vents now. Over.

SC They're closed.

CAPCOM Thank you, sir.

SC From the surface, we could not see any stars out the window, but I had my overhead patch. I'm looking at the earth. It's big and bright and beautiful. Buzz is going to give a try at seeing some stars through the optics.

CAPCOM Roger, tranquility. We understand. It must be a beautiful sight. Over.

PAO We would like to point out that the fuel pressure problem that had been called to the attention of the crew, is in the descent system and it is probably the downstream of the tanks where a small amount of fluid has been trapped in a line and we don't expect it to cause any problem. The line should be able to take far more pressure than the fluid would exert. In the event that there was an overpressurization, we would expect that the line would spring a small leak, the pressure would drop rapidly. Again, we point out that we do not see this as a significant problem.

CAPCOM Columbia, Houston. 2 minutes to LOS. You're looking great going over the hill. Over.

COLUMBIA Okay, thank you. My glad to hear the system's looking good. You have a suggested attitude for me. This one here seems alright.

CAPCOM Stand by.

COLUMBIA Now you know when it's lunchtime. Right?

CAPCOM Say again.

COLUMBIA Oh, disregard.

CAPCOM Columbia, Houston. You got a good attitude right there.

COLUMBIA Okay, thank you.

PAO This is Apollo Control. We've had Loss of Signal now from the command module and of course, we'll maintain constant communications with the lunar module on the lunar surface. We have some heart rates for Neil Armstrong during that power descent to the lunar surface. At the time the burn was initiated, Armstrong's heart rate was 110. At touchdown on the lunar surface, he had a heart rate of 156 beats per minute, and the flight surgeon reports that his heart rate is now in the 90's. We do not have biomedical on Buzz Aldrin.

PAO This is Apollo Control at 103 hours 32 minutes. We have an update on that touchdown time on the lunar surface. This still is not the final, official time which we will get from readout of data, but the refined time is 102 hours 45 minutes 40 seconds, which would have been 12 minutes 36 seconds after initiating the powered descent. That was 102 hours 45 minutes 40 seconds for touchdown and a total time of powered descent 12 minutes 36 seconds, and we would expect then those numbers to change perhaps a little when we get final data readouts.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69, GET 103:34, CDT 16:06, 314/1

CAPCOM Tranquility base, Houston. If you want me to I can give you a acq on the omission time, every 30 minutes, over.

CAPCOM Tranquility, Houston, I'm counting down to T 3 time. If you'd like to give me a hack we can set up on our vent timer over.

EAGLE Roger, How about counting up?

CAPCOM Roger, you want it counting up? Stand by.

CAPCOM Tranquility, Houston. On my mark 62 30 mark, 62 30 from pass PDI.

EAGLE What we're looking for, Charlie is the time counting up to T2 that'll be equal to 60 minutes, or T3, be equal to 60 minutes on T3.

CAPCOM Roger, we'll have it for you.

CAPCOM Tranquility base, Houston, reset the event timer to zero and on my mark at 103 39 41. We'll give you a hack and it'll be 1 hour, over.

EAGLE Roger.

CAPCOM And we've got about almost 3 minutes to go, Neil, over.

EAGLE Okay.

CAPCOM Tranquility base, stand by on the event timer.

CAPCOM Tranquility base, Houston. On my mark start your event timer.

CAPCOM 5 4 3 2 1, mark.

EAGLE Roger, we got it, thank you.

CAPCOM Rog, Neil.

END OF TAPE

PAO This is Apollo Control at 103 hours 44 minutes. There will be a brief statement from Dr. Thomas Paine, NASA Administrator, in the building 1 auditorium at 4\_30. We also have some updated information on the landing point. It appears that the spacecraft, Eagle, touched down at 799 degrees north, or just about on the lunar equator. And 23.46 degrees longitude, which would have put it about 4 miles from the targeted landing point downrange. We're now 54 minutes - rather 27 minutes from reacquisition of the command module, and of course, we're in constant contact with the lunar module on the surface. At this point, all LM systems seem to look very good.

CAPCOM Tranquility, Houston. We see the star angle difference. Looks good.

EAGLE Okay, that last star was Navi, and it wasn't too well distinguishable. I can see where that error could come in. I think for the gravity alignment, with one star it (garbled) will be quite good.

CAPCOM Roger. Stand by on the noun 93.

CAPCOM Hello Tranquility Base, Houston. We'd like you to torque that. Over.

EAGLE Houston, this is Tranquility. Do you want us to accept this position? Over.

CAPCOM Tranquility, Houston. We're looking at it. Stand by. We'd like you to pull the circuit breaker on panel 11 for the mission timer. Over.

EAGLE Rog. I've already done that, Charlie.

CAPCOM Okay.

CAPCOM Tranquility, Houston. We'd like you to reject that RLS. Over.

EAGLE Roger.

CAPCOM And Tranquility Base, Houston. We'd like you to call - after this, call P00, and give us a E-memory dump.

EAGLE Okay, here comes the E-memory dump.

CAPCOM Roger.

EAGLE And we got 1106.

CAPCOM Roger.

CAPCOM Hello Tranquility Base, Houston. Did I copy program alarm 1106 from you? Over.

EAGLE Rog. That's affirmative.

CAPCOM Okay, stand by.

EAGLE Could that, by any chance, be due to the fact that I flashed the update link switch to data while that was going on? Over.

CAPCOM Stand by.

CAPCOM Hello Tranquility Base, Houston. The span guys think that's conceivable. Stand by. I think we want another verb 74.

EAGLE Okay, standing by.

CAPCOM Hello Tranquility Base, Houston.  
We'd like another verb 74. Over.

TRANQUILITY Roger, here it comes.  
CAPCOM Tranquility base, Houston. On my mark  
it will be GET 103:53:00. Mark 103:53. Correction 54.  
TRANQUILITY Roger.  
CAPCOM Hello Tranquility, Houston. We have  
the LM ascent package. Ready to go, over.  
TRANQUILITY Standby.  
TRANQUILITY Roger, ready to copy the LM assest pad.  
CAPCOM Rog, Tranquility. TIG 104 39 47 00  
55 35 8 00 32 2 plus 00 22. T to 47 plus 37 13 0 minus 70  
615 plus 58 620 plus 56 936, over.  
TRANQUILITY Roger, LM assest pad: 104 39 47 00  
55 35 8 00 32 2 plus 00 22 plus 37 13 0 minus 70 615 plus 58  
620 plus 56 936, over.  
CAPCOM Roger, Tranquility, good readback. We  
also have a CSI pad if you are ready to copy.  
TRANQUILITY Okay, we are ready to go.  
CAPCOM Roger, coming at you with a CSI. NOUN  
11 105 35 37 00. 107 11 30 00. 05 38 minus all zeros. At  
the AI is NA 09 37 correction 09 356 10 31 5 plus 05 38 minus  
all zeros plus 0012, over.  
TRANQUILITY Rog, say again R1 and NOUN 86.  
CAPCOM Roger, R1 is plus 0 53 8 and we have  
a load for you. Will you please give us P00 and data, over.  
TRANQUILITY Roger, before I do that I would like  
to designate the, rendezvous radar app to plus X.  
CAPCOM Roger.  
PAO This is Apollo Control at 103 hours  
57 minutes. We will be taking the release line down briefly  
for a statement from Thomas Paine, NASA Administrator. We  
will be recording further conversations with the spacecraft  
and will played those back following the statement. This  
is Apollo Control at 103 hours 58 minutes.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 104:10, CDT 16:41, 317/1

PAO This is Apollo Control at 104 hours  
10 minutes. We understand there's been a brief delay in  
the statement from Nasa Administrator Thomas Pane. We  
will catch up with the tape recorded conversation that we  
have had with Eagle on the lunar surface, at this time.

EAGLE Noun 86, plus 0 538 +all 0, and  
the last one was 0012 and what's the sign of that please?

CAPCOM Tranquility, Houston the Delta-v  
Y is minus all zeros. The Delta-v Z is +0012, over.

EAGLE Roger +0012.

CAPCOM Roger, good read back.

EAGLE Houston, tranquility base,  
the DSKY's yours and up data linking data.

CAPCOM Roger, thank you Tranquility.

CAPCOM Hello Tranquility base, Houston.  
On my mark it will be 37 minutes to T3, over.

EAGLE Okay.

CAPCOM Stand by, mark 37 minutes till  
T3.

EAGLE Okay, thank you.

CAPCOM Tranquility, this is Houston.  
It's your computer. We got the load in. You can start your  
P57.

EAGLE Roger, thank you.

EAGLE Houston, Tranquility base.  
Does somebody down there have the light button keyed, over?

CAPCOM Stand by and we'll check.

CAPCOM Tranquility, Houston, do you  
still hear it now, over.

EAGLE Yea I still hear it. It  
sounds like somebody banging some chairs around in the back  
room.

CAPCOM Roger, that's a voga that you  
hear for the CSM to keep the noise down on the loop. Maybe  
we got a msfn relay, stand by.

EAGLE Okay.

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 104:10, CDT 16:41, 317/2

CAPCOM Tranquility, Houston, we got the  
MSFN relay in. You're hearing the voga which is a noise  
supression device. We'll try to take it out, over.

EAGLE Alright, thank you.

CAPCOM Tranquility, Houston. It ought  
to be a little quieter up there now. We disabled the  
MSFN relay.

EAGLE Okay, I think the noise has  
stopped now, thank you Charlie.

CAPCOM Rog.

END OF TAPE

PAO This is Apollo Control, Houston at 104 hours, 31 minutes now into this historic mission, Apollo 11. During the news conference with NASA Administrator Dr. Thomas Paine, we had conversation with both Eagle and Columbia and we'll play that tape for you now.

CAPCOM Tranquility base, Houston. On my mark, 25 minutes to T3. Stand by. Mark, 25 minutes until T3.

EAGLE Roger. Thank you, Charlie.

COLUMBIA Houston, Columbia. How's it going?

CAPCOM Columbia, Houston. We're reading you about 3 by. Over.

COLUMBIA I'm on OMNI, Charlie. How's it going?

CAPCOM Roger. Understand. OMNI Charlie. Mike, be advised. We have an update for you on the P22 for the LM. We estimate he landed about 4 miles downrange. Your T1 times are updated and your T2, if you're ready to copy. Over.

COLUMBIA Ready to copy.

COLUMBIA Ready to copy.

CAPCOM Roger, Columbia. T1 1043224 1043733 2 miles south. Time of closest approach is 1043908.

CAPCOM Hello, Tranquility base, Houston. We copy the Noun 93. You can torque them. Over.

COLUMBIA Houston, 4 miles long. Is that correct Houston?

CAPCOM That's affirmative, Columbia. It's about 4 miles long. Stand by. We'll have you a map location momentarily. Over.

EAGLE Houston, Tranquility base. Do you have an update? I'm waiting for it. Over.

CAPCOM That's affirmative. Stand by on the DAP. DAP pad for you is LM weight 10906. Over.

EAGLE Roger. 10906.

CAPCOM Roger.

CAPCOM Columbia, Houston with a latch of latitude longitude over 2 update the LM position. Over.

CAPCOM Columbia, Houston. Over.

COLUMBIA Go ahead, Houston.

CAPCOM Roger, Mike. We got an update on the latch longitude for the LM, if you're ready to copy. Over.

COLUMBIA Go ahead.

CAPCOM Roger. Columbia, it's plus 7 - correction - plus 0.799, but latch, plus 11.730 for the longitude over 2. Over.

COLUMBIA Thank you. You want me to read that back?

CAPCOM Say again. Over.

COLUMBIA Does the altitude (garble)

CAPCOM That's affirmative.

CAPCOM Hello, Tranquility base, Houston. You are stay for a T3. We have some surface blockdata if you're

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 17:02 GET 104:31 318/2

CAPCOM ready to copy. Over.  
EAGLE As we understand, we're stay for T3. Stand  
by.  
EAGLE Okay, Houston. Go ahead with your block  
data.  
CAPCOM Roger, Tranquility. T4 1063802, T5 1083615,  
T6 1103430, T7 1123245. Over.  
EAGLE Copy. T4 1063807, T5 1083615, T6 1103430,  
T7 1123245.  
CAPCOM Roger, Tranquility. Stand by one. Tran-  
quility, Houston. Say again your T4 copy. Over.  
EAGLE T4 1063807.  
CAPCOM Roger. Correction on T4 1063802. Over.  
EAGLE Got T4 1063802.  
CAPCOM Roger.  
CAPCOM Hello, Columbia, Houston. We will not  
come up on the MSFN relay. We'd like you to come on panel 9,  
turn on your VHF TR. Over.  
COLUMBIA Okay, I'm on panel 9. Ready to receive.  
You want me to transmit for some reason or other?  
CAPCOM Say again. (garble)  
EAGLE (garble) stand by. Roger. Always bad.  
COLUMBIA Roger. Panel 9 is configured. VHF,  
receive. You want me to transmit with the VHF or something?  
Why do you want me there?  
CAPCOM Columbia, this is Houston. We don't want  
you to transmit, Mike. We just want you in that position in  
case you want to talk to Tranquility. Break. Tranquility,  
Houston. Say again. Over.  
EAGLE Roger. I have a fairly good sized difference  
between battery both on 5 and 6. 6 is reading 33.5 and 5 is  
reading 36.5. Is that what you expect? Over.  
CAPCOM Roger. Stand by. Tranquility, Houston.  
There both coming up in voltage. No problem. We're still go.  
Over.  
EAGLE Roger.  
CAPCOM Hello, Tranquility base, Houston. Could  
you please give us a readout now of all of your descent tank  
pressures? Over.  
EAGLE Okay, Houston. On descent 1, fuel and  
oxidizer are reading 10 psi. And descent 2, fuel only is  
reading 10 psi, oxidizer 11 psi.  
CAPCOM Roger, Tranquility. Thank you much. Out.

END OF TAPE

TRANQUILITY Houston, Tranquility base is ready to go through the power down and terminate the simulator count-down.

CAPCOM Roger, standby.

CAPCOM Hello Tranquility base, Houston. You can start your power down now, over.

TRANQUILITY Roger, they have been started.

CAPCOM And Tranquility base the white team is going off now and let the maroon team take over. We appreciate the great show. It was a beautiful job, you guys.

TRANQUILITY Roger, couldn't of had better beaming from all of you back there.

TRANQUILITY Houston, Tranquility.

CAPCOM Go Tranquility, over.

TRANQUILITY Roger, a recommendation at this point is planning an EVA with your concurrent starting about 8:00 this evening, Houston time. That is about three hours from now.

CAPCOM Standby.

TRANQUILITY We will give you the time check about that.

CAPCOM Tranquility base, Houston. We though about. We will support it. We're go at that time, over.

TRANQUILITY Roger.

CAPCOM You guys are getting prime time TV there.

TRANQUILITY Hope that little TV set works but we'll see.

CAPCOM Rog.

CAPCOM Hello Tranquility base, Houston. With your 8:00 Houston time a reference to opening the hatch or starting the prep for EVA at that time, over?

TRANQUILITY That's the hatch opening.

CAPCOM That's what we thought. Thank you much.

TRANQUILITY That might be a little later than that but in other words, start the prep in about an hour or so.

COLUMBIA Houston, Columbia, copy NOUN 49.

CAPCOM Standby, Columbia.

CAPCOM Tranquility base, Houston. That's fine. We are ready to support you any time, over.

TRANQUILITY All right.

CAPCOM Break. Columbia, we see the NOUN 49, standby.

CAPCOM Columbia, Houston. We got the data. We would like a VERB 34, over.

COLUMBIA All right, standby, Charlie, for the next VERB.

CAPCOM Roger, Columbia. Did - how did Tranquility look to you down there, over?

COLUMBIA It really looks smooth, but I was unable to see him. I just picked out a distinguishable crater nearby and marked on it.

CAPCOM Roger.  
COLUMBIA But it looks like he made it there  
you know.  
CAPCOM Hello Columbia; Houston. I understand  
you could not see Tranquility. What was you marking on, over?  
COLUMBIA Houston, Columbia. Say again, I could  
not see him. Auto optics pointed at a spot nearly close to  
the coordinates which you gave me so I picked a tiny crater  
in that area and marked on it so I will be able to have repeateable  
data, but I was unable to see him.

CAPCOM Roger, copy.  
PAO This is Apollo Control, Houston at  
104 hours 44 minutes. You heard that last exchange and  
there is a very strong indication we might have an early  
EVA with the hatch open perhaps at 8:00 Houston time. One  
other item of significance that this - the pressure rise in  
- depth descent propellant line downstage of the tanks has  
relieved all aspects of the mission, looking very good at  
this time. At 104 hours 45 minutes now into the flight  
of Apollo 11, this is Apollo Control, Houston.

CAPCOM Hello, Tranquility base, Houston. On  
our depth venting and that fuel problem heat exchanges is  
cleared up. We heard that the ice is melted and we are in  
good shape now, out.

TRANQUILITY Houston, Tranquility is going to  
put the track modes and slow down.

PAO This is Apollo Control, Houston at  
105 hours now into the flight of Apollo 11. We expect a  
- our - our capsule communicator Owen Garriott to pass along  
data to spacecraft Columbia, momentarily. We're standing  
by for that. Meanwhile, I think we should discuss a little  
further the projected EVA. Our current plan is to have  
crewmembers above the Eagle to eat and relax for a little  
while prior to starting EVA preps. We won't know with  
certainty or have a reasonable time hack until about an  
hour before the scheduled event. Right it looks like it  
could occur at 8:00 Houston time. We have conversation  
going now with the spacecraft. We'll pick that up.

PAO This is Apollo Control, Houston.  
We will shutdown the line at this time and turn to the  
news conference.

END OF TAPE

PAO This is Apollo Control, Houston at 105 hours 30 minutes on to the mission, Apollo 11. The spacecraft Columbia is now out of range with Mission Control Center, Houston, passing over the far side of the Moon. As it passed out of sight, we read an apolune of 63 nautical miles; a perilune of 56 nautical miles; a velocity of 5367 feet per second. We had conversation both with Tranquility base and Columbia during this span of time. Also, as will come up in that course of conversation. Lunar module pilot Buzz Aldrin delivers a message to people everywhere listening. We'll play those tapes for you now.

CAPCOM Columbia, Houston. We noticed that you are maneuvering very close to gimbal lock. I suggest you move right away, over.

COLUMBIA Yeah, I am going around it. I've noticed GMC auto maneuvers in this pass. Roll 270, pitch 101, yaw 45.

CAPCOM Roger, Columbia.

COLUMBIA I assumed that the (garbled) gimbals (garbled - inaudible)

CAPCOM Columbia, Houston, you were unreadable. Say again please.

COLUMBIA Disregard

CAPCOM Columbia, Houston. Several items for you over.

COLUMBIA Ready to copy.

CAPCOM Columbia, Houston. First of all we'd like a waste water dump to 10 percent on the backside. Secondly, it does not look like we will need any plane change at this time, so we will not be uplinking a new REFSMMAT. Third item I would like all of your cryo heaters to AUTO and we are ready for a battery charge, battery BRAVO. It will last about 7 hours. If you should go to sleep, we will be terminating that charge, but at the moment we can go ahead and start the BAT charge on BAT BRAVO, and a final item for your SMRCS configuration for your rest period. Register 01 for the dap is 11 111, dap register 02 01 100, and your auto RCS select switches - quad ALPHA pitch jets on only, quad BRAVO are on, quad CHARLIE and quad DELTA all off, over.

COLUMBIA Roger, waste water to 10 percent on the backside, no new REFSMMAT, cryo heaters on to AUTO, (garbled) dap is 11 111, 01 100 (garbled) quad A pitch jet on (garbled), over.

CAPCOM Columbia, Houston, Roger.

CAPCOM Columbia, Houston. We will have a state vector update for you a little later. We are not prepared with it right now and another subject from Tranquility base, they are prepared to begin their EVA early. They expect to begin depress operations in about 3 hours at 108, approximately 108 GET, over.

COLUMBIA Sounds good to me. Tell Neil to

COLUMBIA watch where he goes.  
 CAPCOM Columbia, Houston. We would like your PRD readout when possible and we have checked over your EM dump, it all looks okay.  
 CAPCOM Tranquility base, Houston, over.  
 TRANQUILITY All right, Houston.  
 CAPCOM Tranquility, Houston. We would like your PRD readout, and we have double checked your EM dump and it all looks okay, over.  
 TRANQUILITY Rog, I understand our EM dump was good, PDR assimilator is 11014, and LMP is 09011.  
 CAPCOM Roger, Tranquility, break -  
 CAPCOM Columbia we would like for you to react with your high gain and attempt a manual lockon, over.  
 COLUMBIA (inaudible)  
 TRANQUILITY Houston, Tranquility here. The LMP's readouts may very possibly be 09017, over.  
 CAPCOM Tranquility, Houston. Roger, 01097 is an update on your readout.  
 COLUMBIA Columbia -  
 TRANQUILITY I'll let you know for sure when it goes to either 12 or 18.  
 CAPCOM Tranquility, Houston. Roger, the medics report your latter reading 17 appears to be the correct one, over.  
 TRANQUILITY Roger.  
 COLUMBIA Columbia's is in the high gain.  
 CAPCOM Roger, Columbia, sounding much better now.  
 CAPCOM Columbia, Houston. Request P00 and accept and we will uplink another state vector, over.  
 COLUMBIA Roger, go P00 and accept.  
 CAPCOM Columbia, Houston. I suggest you put BAT A on your BAT relay buss, over.  
 COLUMBIA Okay.  
 CAPCOM Columbia, Houston. We are through with your computer. You can go to block.  
 COLUMBIA Roger, block.  
 CAPCOM Tranquility base, Houston, over.  
 TRANQUILITY Go ahead, Houston, Tranquility base.  
 CAPCOM Tranquility base, Houston. We've reviewed the checklist and about the only change in order to advance the EVA that we've found is that you will want to delay your lithium hydroxide change until after the EVA rather than before, over.  
 TRANQUILITY Roger, we'd just assumed to make a change in jettersoning the old one, over.  
 CAPCOM Tranquility base, Houston. We would like to delay that LOIH change until after the EVA. There is a possibility you could jetterson the canister when you

CAPCOM jettison your (garble)  
TRANQUILITY All right. We'll planned it that way,  
over.  
CAPCOM Roger, Tranquility.  
CAPCOM Columbia, Houston, over.  
COLUMBIA Houston, Columbia.  
CAPCOM Columbia, Houston. We show your evap  
out temperature running low. Request you go to manual temperature  
control and bring it up. You can check the procedures in  
ECS MAL 17, over.  
COLUMBIA Roger.  
CAPCOM Columbia, Houston. I have a P22 update  
for you.  
COLUMBIA Columbia, go ahead.  
CAPCOM Columbia, Houston. Your P22 auto - auto  
optics landmark ID on LM. P1 106 plus 30 plus 31. P2 106  
plus 35 plus 41. Two nautical miles south. Your TCA 106  
plus 37 plus 16. Shaft angle 357.9 and trunnion angle 44.3,  
over.  
COLUMBIA (garbled)  
CAPCOM Columbia, Houston. We have your LOS  
and at 3 minutes AOS will be 106 plus 11, over.  
COLUMBIA Roger.

END OF TAPE

EAGLE Houston, Tranquility. Over.

CAPCOM Tranquility, Houston. Go ahead.

EAGLE Roger. This is the LM pilot.

I'd like to take this opportunity to ask every person listening in, whoever and wherever they may be, to pause for a moment and contemplate the events of the past few hours, and to give thanks in his or her own way. Over.

CAPCOM Roger, Tranquility Base.

EAGLE - is about ready to fall off.

As a matter of fact, it just doesn't look like it sunk any at all.

PAO This is Apollo Control, Houston at 105 hours 42 minutes into the flight of Apollo 11. You have heard that statement in our tapes transmission from lunar module pilot, Buzz Aldrin. Our projected time for extravehicular activity, at this point, is still very preliminary. I repeat, it could come as soon as 8:00 p.m. Houston time. We won't know for sure about the time, with reasonable certainty until about an hour before the event. Meanwhile, as we'll soon be progressing toward man's first step on the lunar surface, we have an interesting phenomena here in the mission control center, Houston. Something we've never seen before. Our visual of the lunar module, our visual display now standing still. Our velocity digitals for Tranquility Base now reading zero. Reverting, if we could, to the terminology of an earlier form of transportation, the railroad. What we're witnessing now, is man's very first trip into space with a station stop along the route. At 105 hours 43 minutes, continuing to monitor the loop, this is Apollo Control, Houston.

CAPCOM Tranquility Base, Houston. We'd like some estimate of how far along you are with your eating and when you may be ready to start your EVA prep. Over.

EAGLE I think that we'll be ready to start EVA prep in about a half an hour or so.

CAPCOM Roger, Tranquility.

END OF TAPE

PAO This is Apollo Control, Houston at 105 hours 51 minutes now into the flight of Apollo 11. We've only had one brief conversation over the past several minutes with Tranquility base. Capsule Communicator Owen Garriott asked when Tranquility base might start it's EVA prep, and Armstrong replied, about a half an hour or so. A normal time line for preparations for EVA would be approximately 2 hours. At 105 hours 52 minutes now into the flight of Apollo 11, this is Apollo Control, Houston.

PAO Mark 1 minute now from time of acquisition on Columbia, now on it's 16th revolution around the moon.

COLUMBIA Houston, Columbia, how do you read?

CAPCOM Columbia, Columbia, this is Houston.

EAGLE This is Tranquility base. We are beginning our EVA prep.

CAPCOM Tranquility Base, this is Houston, Roger copy, you're beginning EVA prep. Columbia, Columbia, this is Houston. Reading you loud and clear, over.

COLUMBIA You're loud and clear. Waste water dump is down to 10 percent. I have a question on the P22. Do you want me to do another P22 or is all that information just for my own use in tracking the LM for photographic purposes?

CAPCOM Columbia, this is Houston. We request that you perform another P22. We'd like you to let the auto optics take care of the tracking and devote your energies to trying to pick out the LM on the Lunar surface. If you can find the LM, of course. We're looking for marks on it, but tracking of geographical features doesn't do us all that much good, over.

COLUMBIA Okay, I'll do it. And on the ESCS system, we're having a problem with it. It seems to have gone away without any changing of J52 sensors or anything like that my glycol evaporator outlet temp is up above 50 now and it's quite comfortable in the cockpit so we'll talk more about that one later.

CAPCOM Roger, Columbia. Did you shift into manual control or did the problem resolve itself under auto control? Over.

COLUMBIA The problem went away under auto.

CAPCOM Roger - -

COLUMBIA I did cycle out of auto, I did cycle out of auto into manual, back into auto.

CAPCOM Houston Roger, up.

PAO The capsule communicator you heard there is Bruce McCandless now on duty. Cliff Charlesworth's team of green flight controllers, by in large have returned to the

PAO Control Center at this point. McCandless talked with both spacecraft and as you heard Neil Armstrong reporting from Tranquility Base, stated that EVA preparations are now under way. At 106 hours 14 minutes now into the flight this is Apollo control Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 106:15, CDT 18:47 323/1

CAPCOM Tranquility Base, Tranquility  
Base, this is Houston. Over.  
EAGLE Go ahead, Houston.  
CAPCOM Tranquility, this is Houston.  
We need a second set of PRD readings so that we may establish  
a rate. Over.  
EAGLE Okay. Stand by.  
EAGLE CDR is reading 11014.  
LMP is reading 09017 and 3/4.  
CAPCOM Tranquility, this is Houston.  
We copy your readings. Out.  
PAO The reference there is to  
dosimeter readings from the commander and the lunar module  
pilot. You noted the precision of Buzz Aldrin on that last  
reading. At 106 hours 24 minutes into the flight of Apollo 11,  
continuing to stand by, this is Apollo Control, Houston.  
COLUMBIA Houston, Columbia. How do you  
read on OMNI D, Dog?  
CAPCOM Columbia, this is Houston. We're  
reading you loud with background noise on OMNI D. Over.  
COLUMBIA Okay, I'll stay on D here for  
awhile (garbled)  
CAPCOM Roger. Out.  
COLUMBIA Houston, Columbia. I'm coming  
up from a time for the first (garbled)  
CAPCOM Well, when we got time, you can.  
COLUMBIA the LM. Do you have any  
topographical cues that might help me out here. Auto optics  
is tracking between two craters. One of them is the LM stage.  
It would be long at 11 o'clock. The other would be short and  
behind him at 5 o'clock. And they're great big old craters.  
Depressions.  
CAPCOM Stand by.  
CAPCOM Columbia, this is Houston. The  
best we can do on a couple of features, is to advise you to  
switch to the west of the irregularly shaped crater, and then  
work on down to the southwest of it. Over.  
CAPCOM Columbia, Houston. Another  
possibility is the southern rim of the southern of the two  
old-looking craters. Over.  
COLUMBIA Roger, Houston. Columbia  
no joy I kept my eyes glued to the sextant that time,  
hoping I'd get a flash of vector light off the LM, but I  
wasn't able to see any of my skin areas that you suggested.  
CAPCOM Roger. On that - southern of  
the old craters, there's a small bright crater in the southern  
rim of - one slot would put him slightly to the west of that  
small bright crater, about 500 to 1000 feet. Do you see  
anything down there? Over.

COLUMBIA                    It's not bad now, Bruce, but  
I scanned that area that you talked about very closely and  
nowhere did I see anything.

CAPCOM                    Roger. Out.

CAPCOM                    Columbia, this is Houston. Over.

COLUMBIA                   Go ahead.

CAPCOM                    Columbia, this is Houston on  
your LAM 2 mat. We'd like to confirm the topographical area  
in which

END OF TAPE

CAPCOM Columbia, this is Houston. On your LAM2 map, we'd like to confirm the topographical area in which you were looking on this last period of sighting. As we understand you, you were looking in the vicinity of Poppa 7 to November 8. Is that correct? Over.

COLUMBIA Stand by one.

CAPCOM Roger.

COLUMBIA Houston, Columbia.

CAPCOM Go ahead, Columbia.

COLUMBIA Well, the craters I was telling you about is located exactly at Mike 6.7.

CAPCOM Roger. We found that one.

COLUMBIA The other one was located at 7 - the other one was located at 7.2 - just turns it away from Mike to Nan.

CAPCOM Roger. We believe you're looking a little too far to the west and south. Over.

CAPCOM Roger. Understand. I was looking where our optics was tracking on the average and understand that it should have been more to the north and more to the west. Actually, a tiny bit outside the circle, huh?

CAPCOM More to the north and a little more to the east. The feature to that was just gravity of the small bright crater around the rim of the large fairly old crater, would be about Mike 0.8 and 8.2. Over.

COLUMBIA Well, just give me your best estimate as the new location and the coordiance system and I'll plot it on my map and go from there.

CAPCOM Tranquility base, this is Houston. Can you give us some idea of where you are in the surface checklist at the present time? Over.

EAGLE Okay, we're on the top of page 27.

CAPCOM Roger, out.

COLUMBIA Houston, Columbia. Over.

CAPCOM Go ahead, Columbia.

COLUMBIA Roger. I finally got you back on OMNI-D. I've been unsuccessfully trying to get you on the high gain, and I've gone COMMAND RESET to PROCESS. How do you read me now?

CAPCOM Roger. Reading you loud with background noise. Understand that's OMNI-DELTA or OMNI-BRAVO? Over.

COLUMBIA OMNI-DELTA and you were cut out. I never got your coordinates or estimated LM position. Over.

CAPCOM Columbia, this is Houston. Estimated LM position - a latitude plus 0.799, longitude over 2 plus 11.730. On your chart we would place it. Stand by on the chart and readback on the latitude longitude.

COLUMBIA Yes, the latitude and longitude over 2, 799 and 11730 are the ones that I been giving you in P22. But what I'm interested in is a drift cord into an S-band

COLUMBIA precinct.  
CAPCOM Roger. WE'll have them for you in a second.  
COLUMBIA Thank you.  
COLUMBIA Houston, Columbia. Did you enable the  
S-band relay at least one way affirm Eagle to Columbia so I  
can hear what's going on?  
CAPCOM Roger. There's not much going on at the  
present time, Columbia. I'll see what I can do about the  
relay.  
CAPCOM Columbia, this is Houston. Are you aware  
that Eagle plans the EVA about 4 hours early? Over.  
COLUMBIA Affirmative. When's hatch open time in  
GET estimated?  
CAPCOM Roger. Somewhere around 108 hours. We'll  
have an update for you in that a little later.  
COLUMBIA Okay, I haven't heard a word from those  
guys, and I thought I'd be hearing them through your S-band  
relay.  
CAPCOM Roger. They're about page Surface 27 in  
the checklist, proceeding in good time.  
COLUMBIA Glad to hear it.  
COLUMBIA You got a ground there in MCC?  
CAPCOM Roger, your last, Columbia.  
COLUMBIA Roger, I expect you probably have about  
3 Capcoms and 11 Flight Directors with no place to plug in.  
CAPCOM Roger. Out.  
COLUMBIA The ratio might even be reversed.  
COLUMBIA My coevapsrator temperature is 50 degrees  
and the compressor is just fine.  
CAPCOM Roger. We copy.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69, GET 106:55, CDT 19:27, 325/1

EAGLE Glycol evaporator on the temperature is 50 degrees and the comfort in here is just right.

CAPCOM Roger we copy 50 degrees on the glycol, and comfort index fine.

EAGLE If you'll excuse me a minute I'm going to have a cup of coffee.

CAPCOM Roger.

CAPCOM Columbia, this is Houston. Your map coordinates are POPPA decimal 2 and 6 decimal 3 on the land 2 chart, over.

CAPCOM Columbia, this is Houston. Did you copy the coordinates for the LM, over.

CAPCOM Columbia, Columbia, this is Houston. Did you read we request high gain antenna Yaw 180, pitch zero. I say again Yaw 180, pitch zero on the high gain, over.

CAPCOM Columbia, Columbia, this is Houston do you read, over.

COLUMBIA Houston, Columbia how do you read.

CAPCOM Columbia, this is Houston reading you loud and clear, over.

COLUMBIA Read you loud and clear, Bruce.

CAPCOM Roger, Mike I have the coordinates -

COLUMBIA What's new.

CAPCOM What's new, is I think we have some more coordinates for you on the LM location, over.

COLUMBIA Ready to copy.

CAPCOM Roger, Mike POPPA .2 and 6.3 on your LAM 2 chart, over.

COLUMBIA Roger, POPPA .2 and who .3?

CAPCOM 6.3, I say again, 6.3.

COLUMBIA Thank you POPPA .2 and 6.3 I'll try them.

CAPCOM Roger.

END OF TAPE

COLUMBIA                    Okay, what you are saying is if you look at the catch pond and that just about oh - his middle finger, about 1 to 2 o'clock from his middle finger. Is that right?

CAPCOM                    Roger, about 1 to 2 o'clock from his middle finger if you are using 12:00 being to the west, over.

COLUMBIA                    There must be a (garbled). Okay I'm with you.

CAPCOM                    Okay, and I got LOS and AOS times for you.

COLUMBIA                    Go ahead.

COLUMBIA                    Go ahead, Houston.

CAPCOM                    Roger, your LOS at 107 plus 23 plus 08. AOS at 108 plus 09 plus 06. The next pass for coast tracking. Your time of closest approach is 108 35 28. That's three miles south of track, over.

COLUMBIA                    I understand all right but this new information I would like to try P22 and look for him in a different spot.

CAPCOM                    Standby a minute, please.

COLUMBIA                    Okay, I was looking in the wrong place last time. Auto optics were not pointing at the coordinates you gave me.

CAPCOM                    Roger.

CAPCOM                    Columbia, this is Houston, over.

COLUMBIA                    Go ahead.

CAPCOM                    On your next pass Columbia rather than performing a P22 as scheduled, we would like you to look into the center of the coordinates we gave you which is our best analysis based on MAP physics trajectory and we also have another set of coordinates that we would like you to search in the vicinity of. This last one being based on an interpretation of the geological features that were seen by the crew on the way down. The coordinates of this second site are MIKE .7 and 8.0. I say again. MIKE .7 and 8.0. Over.

COLUMBIA                    Roger, copy. MIKE .7 and 8.0. The only thing is my best tool for looking is the sextant and if I bring the sextant up, I might as well let P22 go at the same time or don't you think -

CAPCOM                    Roger, if you want to go that way, crank it up and then you can drive it around and look where you want, over.

COLUMBIA                    Okay.

CAPCOM                    And if you can find the LM then by all means track it or make a note of where it was and we can track it on the next rev. If you are ready we have a RFSMMAT update that we can pass up to you at this time if you will give us POO and accept, over.

COLUMBIA                    Okay, POO and accept you got and this is an updated landing site RFSMMAT. We still believe that a plane change is not required. Is that affirmative?

CAPCOM                    That's affirmative, Columbia.

COLUMBIA All right.  
PAO This is Apollo Control at 107 hours 15 minutes. We'll still have acquisition of Columbia for another 8 minutes. All systems in Eagle still looking good. Cabin pressure 4.86 pounds showing a temperature of 63 degrees in the Eagle's cabin.  
CAPCOM Columbia, this is Houston. We are through with the uplink. It's your computer.  
COLUMBIA Roger, thank you.  
PAO This is Apollo Control. Our best information at this time on the orientation of Eagle that the plus Z axis, that's the leg with the ladder on it, is yaw 13 degrees south of the ground track. The sun behind Eagle with the - the leg with the ladder on it in a generally westly direction along the ground track, but yaw at 13 degrees south from that ground track.

END OF TAPE

COLUMBIA Houston, Columbia.  
CAPCOM Go ahead, Columbia.  
COLUMBIA On our next pass I'd appreciate the S-band relay mode, over.  
CAPCOM Roger, we're working on that. There haven't been any transmissions from Tranquility Base since we last talked to you. We can not give you a full S-band relay without being assured of high gain antenna. We're working on the partial relay for you, over.  
COLUMBIA Okay, understand, Bruce. Thank you very much.  
CAPCOM Columbia, this is Houston. Approximately 2 minutes to LOS all your systems are looking good from down here, over.  
COLUMBIA Does it look to you like the 240 controller is properly controlling the glycol evaporator outlet temp. It looks al right up here.  
CAPCOM Roger, Columbia, doing this pass on the front side it looked okay to us.  
COLUMBIA Okay, thank you.  
PAO This is Apollo Control at 107 hours 23 minutes, and we've had loss of signal on Columbia. The clock here in the control center counting down to depressurization time on Eagle shows we're 36 minutes 39 seconds away from that event. We believe the crew is pretty well on the time line in EVA preperations. We will next acquire Columbia at 108 hours 9 minutes 6 seconds. Columbia's closest approach to Eagle on this next revolution will come at 108 hours 35 minutes 28 seconds when it should be 3 miles south of the track.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 106:27, CDT 19:59 328/1

EAGLE Houston, Tranquility Base.  
CAPCOM Go ahead Tranquility Base.  
EAGLE Okay. We are on about the middle  
of page 28, clear from 28.  
CAPCOM Roger, Tranquility. We copy.  
PAO This is Apollo Control. Based  
on that checklist report from Eagle, the crew appears to be  
about behind the timeline in EVA preparations.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 106:42, CDT 20:14, 329/1

EAGLE I think we'd - like to put -  
PAO This is Apollo Control at 107 hours  
52 minutes. We're 16 minutes away from acquisition of  
Columbia on it's 17th revolution of the moon. We do not  
at this time have a good estimate for the start of the EVA.  
We'll have to wait until Eagles crew, Neil Armstrong, and  
Buzz Aldrin, give us some more information about how they're  
coming along in the preparations for the EVA. Indications are  
now that they are running on the order of 30 minutes behind  
the nominal time, preparations line. Maybe a little bit longer.  
But we'll have to wait until we hear from them again before  
we can get a good estimate on the time for starting the EVA.  
CAPCOM Tranquility Base this is Houston, over.  
EAGLE Roger, go ahead, Houston.  
CAPCOM Roger, Tranquility, we're coming up  
in about 6 minutes on GET at 108 if you'd like to start your  
event timer we can give you a hack at 108 00 over.  
EAGLE Wilco.  
EAGLE Houston, Tranquility, we're ready to  
start with the electrical check out. We're going to S-band  
modulate FM over.  
CAPCOM Roger, Tranquility this is Houston,  
we copy. Go ahead with the FM and we missed the mark at 108.  
Do you want us to try and give you one at 108 05, over.  
EAGLE I think we've got the timers on. We've  
got 1 minute and 30 seconds mark. Roger, we copy and you're  
in sinc with us.

END OF TAPE

PAO This is Apollo Control at 108 hours, 2 minutes. This latest report that the crew is getting the electrical checkout indicates they're about 40 minutes behind the timeline. We will acquire Columbia in 6 minutes.

TRANQUILITY Help you on that?

TRANQUILITY Feed it, or disconnect to her?

TRANQUILITY Say again.

TRANQUILITY Switch electrical umbilical to - on the F type - have to get up straight - up. Radio comm.

TRANQUILITY That's got it. TRANQUILITY Lift.

TRANQUILITY That's the parking lift.

TRANQUILITY Park.

TRANQUILITY All jets. Al we've got antennas down and not real good, is it? Okay, here. Up. I'll put my antenna up.

COLUMBIA Okay, how do you read now?

TRANQUILITY Okay.

COLUMBIA Okay. I think that's going to be better.

TRANQUILITY You read me all right now?

COLUMBIA Yes.

TRANQUILITY Okay. That sounds pretty good.

I guess it's a combination of the volume and the antenna. May have been just the volume that was bad too high. Why don't you try it - start it again, see if (garble).

COLUMBIA Okay.

TRANQUILITY All right. 1 2 3 4 5. 5 4 3 2 1.

That sounds pretty good.

COLUMBIA Better.

TRANQUILITY Better keep it pretty close to your mouth though.

TRANQUILITY Okay. Open up your audio circuit breaker and disconnect the LM comm cable.

PAO We have acquisition of Columbia.

CAPCOM Columbia, Columbia. This is Houston. Over.

COLUMBIA Houston, probe me a better gain.

How do you read?

COLUMBIA Roger Columbia. Reading you loud and clear on the high gain. We have enabled the one way MSFN relay that you requested. The crew of Tranquility Base is currently donning slippers. The LMP has his PLSS on, COMM checks out and the CDR is checking his COMM out now. Over.

COLUMBIA Yes, I guess. Thank you kindly.

COLUMBIA Houston, the TPI increased the platform up on the back side. I have a P-52 option to clear when you're ready to copy the data.

APOLLO 11 MISSION COMMENTARY 7-20-69 CDT 20:34 GET 108:02 330/2

CAPCOM Go ahead, Columbia.  
COLUMBIA Roger on stars 43 and 44, the  
angle difference 4 balls 1. NOUN 93 plus 00057 plus 00166 minus  
00022 and the time is 1073038. Over.  
PAO Audio TECH coast to coast.  
VH A OFF, VH B OFF. I've got for you PTP COMMAND.  
CAPCOM Columbia, this is Houston. Copy  
star angle difference of 4 balls 1 NOUN 93 plus 00057  
plus 00166 minus 00022 time of 1073038. Over.  
COLUMBIA You got it.  
CAPCOM Roger. Are you reading Tranquility base  
now?  
COLUMBIA Okay. You've got an O and a B.  
CAPCOM What is your oz quantity by the way?  
COLUMBIA 02 quantity is about 91.  
CAPCOM I've got 92.  
COLUMBIA Okay now. I'm going to mode  
select B.  
CAPCOM - are you in B?  
COLUMBIA I'm in B.

END OF TAPE

EAGLE Are you in B?  
EAGLE I'm in B.  
EAGLE A.  
EAGLE A.  
EAGLE I'm in A.  
EAGLE Okay, how do you read me?  
EAGLE I read you.  
EAGLE You're loud and clear.  
EAGLE (garbled) one I didn't do. (garbled)  
EAGLE By a mountain. Okay?  
EAGLE Both. That's verb select to A,  
on.  
EAGLE A, on.  
EAGLE How do you read?  
EAGLE Took you to 1 and down.  
EAGLE I got one.  
EAGLE Got it? Okay, one antenna is  
out. Verify plus O<sub>2</sub> bottle pressure greater than 85 (garbled)  
Do you have voice with (garbled)  
EAGLE Yeah.  
EAGLE Houston, Tranquility. How do  
you read? Over.  
CAPCOM Neil, Neil, this is Houston  
through Tranquility radio check. Over.  
EAGLE Roger. Houston, this is Neil.  
How do you read?  
CAPCOM Neil, this is Houston. We're  
reading you loud and clear. Break, break. Buzz, this is  
Houston through Tranquility. Over.  
EAGLE Roger, Houston. This is Buzz  
through Tranquility. How do you read? Over.  
CAPCOM We're reading you loud and clear,  
Buzz. Out.  
EAGLE And are you getting a signal on  
the TV? Over.  
CAPCOM That's affirmative, Neil. The  
data that we're receiving looks good and we are receiving  
sync pulses and signal on TV.  
EAGLE Okay, I still find that the  
area around the ladder is in a complete dark shadow so we're  
going to have some problem with TV, but I'm sure you will  
see the - you'll get a picture from the lighted part.  
CAPCOM This is Houston. We copy and  
right toward the end of your transmission you mentioned  
lighted horizon. You trailed off down into the noise level,  
Neil. Over.  
CAPCOM Columbia, this is Houston. Are  
you reading Tranquility alright on the relay? Over.  
COLUMBIA I believe so. I haven't heard

COLUMBIA anything fairly lately breaking  
up, but up until about 3 minutes ago, I was reading them  
loud and clear.  
CAPCOM Roger. Sounds like you're  
getting it all.  
COLUMBIA Thank you.  
CAPCOM Tranquility base, this is  
Houston. We request you open the TV circuit breaker at  
the present time. We've had it on about 15 minutes now  
with the mesa closed. Over.  
TRANQUILITY Roger.  
TRANQUILITY (garbled)  
CAPCOM Say again, Neil.  
CAPCOM Neil. Neil. This is Houston.  
I can hear you trying to transmit although your transmission  
is breaking up. Over.  
CAPCOM Buzz. Buzz. This is Houston.  
Do you read? Over.  
ALDRIN Roger, Houston. This is Buzz.  
I hear you. Over.  
CAPCOM Roger. You're coming through  
loud and clear, Buzz. It's a beautiful signal.  
ALDRIN Neil's got his antenna up now.  
Let's see if he comes through any better now.  
ARMSTRONG Okay. Houston, this is Neil.  
Do you read?  
CAPCOM Neil, this is Houston. Reading  
you beautifully.  
ARMSTRONG My antenna's scratching the  
roof.  
CAPCOM We copy. Your antenna is  
scratching the roof. Roger.  
ARMSTRONG Do we have a go for cabin  
depress?  
ALDRIN I hear everything but that.  
ARMSTRONG Houston, this is Tranquility.  
We're standing by for a go for cabin depress. Over.  
CAPCOM Tranquility base, this is  
Houston. You are go for cabin depressurization. Go for  
cabin depressurization.  
TRANQUILITY Roger. Go for cabin depressuri-  
zation.  
CAPCOM Roger. Thank you.  
ALDRIN Houston, this is Buzz. Verify  
cabin (garbled) circuit breaker open. Over. (garbled)  
We'll have to pull that one out. Over.

END OF TAPE

COLUMBIA Wait a minute.  
CAPCOM Columbia, this is Houston. Your LM  
line of sight time acquisition will be, Tranquility base,  
is 108 plus 29. LOS is 108 plus 42, over.  
COLUMBIA Circuits is in rebound, AUTO.  
CAPCOM In AUTO.  
TRANQUILITY Eagle (garbled)  
CAPCOM We'll pick you up on OMNI C or D.  
Standby please.  
(?) (garbled) a slight recess.  
(?) (INAUDIBLE)  
TRANQUILITY Takes a while for the water separator.  
TRANQUILITY I don't understand. Dew fan number 01  
circuit breaker opened.  
CAPCOM Buzz, this is Houston. We would like  
you to pull the suit fan DELTA C circuit breaker on panel 16  
over.  
TRANQUILITY Roger, I have it. (inaudible).  
(INAUDIBLE)  
TRANQUILITY Very good.  
TRANQUILITY Okay there it is. The TS latch on  
water separator.  
TRANQUILITY Main booster isolation valve to 25 -  
TRANQUILITY Thank you.  
TRANQUILITY Got it. (garbled) prime rows is.  
TRANQUILITY Okay.  
TRANQUILITY (garbled)  
TRANQUILITY Let me do that for you.  
TRANQUILITY (INAUDIBLE)  
TRANQUILITY Mark 1.  
TRANQUILITY (garbled) valves.  
TRANQUILITY (garbled)  
TRANQUILITY Okay.  
TRANQUILITY (garbled) locked in the stones.  
TRANQUILITY Okay.  
TRANQUILITY All of the (garbled)  
TRANQUILITY (garbled) locked and lock-lock.  
TRANQUILITY Did you put it -  
TRANQUILITY Oh, wait a minute.  
TRANQUILITY Should be (garbled).  
TRANQUILITY (garbled).  
TRANQUILITY Roger, (garbled).  
TRANQUILITY I'll try it on the middle.  
TRANQUILITY All right check my (garbled) valves  
vertical.  
TRANQUILITY Both vertical.  
TRANQUILITY That's two vertical.  
TRANQUILITY Okay.  
TRANQUILITY (garbled).  
TRANQUILITY Locked and doubled locked.  
TRANQUILITY Okay.

TRANQUILITY Miss marked.  
TRANQUILITY Sure wished I would of shaved last  
night.  
PAO That was a Buzz Adrin's comment.  
TRANQUILITY Have any down movements that you might  
swing over.  
TRANQUILITY I verified this move to (garbled).  
TRANQUILITY Do what?  
COLUMBIA All right you guys can read me on VHF,  
but you sure sound good down there.  
TRANQUILITY Handlocked.  
TRANQUILITY Okay.  
TRANQUILITY All right the vent window's clear. And  
we will leave it on the engine cover.  
TRANQUILITY Verify (garbled).  
TRANQUILITY How's the count now, Houston?  
CAPCOM All right, this is Houston. The count  
is very good. You are coming in loud and clear, and Mike  
passes on the word that he is receiving you and following your  
progress with interest.  
TRANQUILITY (garbled).  
TRANQUILITY Very well, thank you.  
TRANQUILITY Have you got all the material up in  
the back?  
TRANQUILITY Complete.  
END OF TAPE

EAGLE On lock. That's locked and aligned.  
EAGLE Now I see them. Pull the R-seater down.  
EAGLE Wonder if we're triggering all the time.  
I don't think so.  
EAGLE Houston, Neil. How do you read?  
CAPCOM Neil, this is Houston. We read you loud  
and clear and I read both the comments that were said, "I  
wonder if we're triggering all the time." and "I don't think  
so." Prior to that it was relatively quiet. Over. Roger.  
Out.  
EAGLE Okay, we're hearing a little bit of back-  
ground noise and I just wanted to make sure that we weren't  
continually keyed.  
CAPCOM Doesn't sound like it.  
EAGLE Want to put the light back up?  
CAPCOM Neil, this is Houston. Would you verify  
your RC vent window's clear. Over.  
EAGLE They're clear. Over. That's verified.  
CAPCOM Roger. Out.  
EAGLE That's good.  
EAGLE Do we move it?  
EAGLE Okay, we can stow this.  
EAGLE Pan's dirty. Alright, prep for EVA.  
First you connect the water hose. Okay, let me get your -  
Okay, now we should be able to stow these up.  
PAO Cabin pressures on both vehicles reading  
4.9 pounds per square inch. Columbia's temperature - 70  
degrees F. Eagle's temperature 61 degrees F.  
CAPCOM Columbia, this is Houston. Any joy on  
the LM left pass? Over.  
EAGLE Okay, there all stowed. And clip water  
hose to PGA. I can't lift it from that.  
EAGLE Okay, that's in unlock. Okay.  
EAGLE Houston, Buzz here. Over.  
CAPCOM Go ahead, Buzz. This is Houston.  
EAGLE Roger. Our COMM didn't seem to clear up  
a good bit. Did CSM just go over the hill?  
CAPCOM Negative. He's been over the hill I figure  
for a minute or so.  
EAGLE I don't remember -  
CAPCOM Correction - he should be losing contact  
with you in about 8 minutes.  
EAGLE About 8? The flag lock system. Yes,  
flight suit check, blue monster check, lock locks, red lock,  
purge lock, and on this side garble) and lock locks on both  
sides, AUTO lock, and the COMM.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69, GET 108:42, CDT 21:14, 334/1

EAGLE (garbled) mark.  
CAPCOM Columbia, this is Houston. Do you  
read, over.  
COLUMBIA Columbia reads you loud and clear on  
onmi C Charlie.  
CAPCOM Roger, Columbia, I have a LOS and AOS  
signs for you this pass with MSFN. LOS 109, +21 +12, AOS  
coming around on the corner 110 07 35, over.  
COLUMBIA Okay, that's fine.  
CAPCOM Roger, up.  
TRANQUILITY (garble)  
TRANQUILITY Okay.  
TRANQUILITY All right, verify your diverter valve  
open.  
TRANQUILITY What position?  
TRANQUILITY Diverter valve up.  
TRANQUILITY Diverter valves up.  
TRANQUILITY Just a minute here.  
TRANQUILITY Switch on.  
TRANQUILITY Mine's running also, and it's cooling  
all right.  
TRANQUILITY Thank you.  
TRANQUILITY Got them both on, verify cooling.  
That's what it yea verify cooling. Why don't you bend down  
and let me stow that. Mine is back to EMU. He did that pretty  
well.  
TRANQUILITY Pretty well complete.  
CAPCOM Columbia, this is Houston, over.  
COLUMBIA This is Columbia, go ahead.  
CAPCOM Roger, were you successful in spotting  
the LM on that pass, over.  
COLUMBIA Negative, I checked both locations.  
CAPCOM Okay if you'd like to look again next  
pass we have a different set of coordinates based on the on  
board C57 solution of the LM. These are echo .3 and 4.8.  
I say again echo .3, 4.8 same chart, over.  
COLUMBIA Roger I'll look down and how about put-  
ting that in your machine and come up with the coordinates for  
latitude and longitude over Q and altitude for P22 so it can help  
me as best it can.  
CAPCOM Roger.  
COLUMBIA (garbled) is still pointing in the  
wrong place.  
CAPCOM Columbia, this is Houston, latitude  
plus 0.523, longitude divided by 2, 11.710, over.  
COLUMBIA Roger understand +00523 and +11710  
thank you.  
CAPCOM Houston roger up.

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 108:42, CDT 21:14, 334/2

CAPCOM Columbia this is Houston. We're requesting high gain antenna, pitch, yaw, pitch 0, yaw 200, that is pitch 0, yaw 200, over.

COLUMBIA (garbled)

PAO In the control center, a clock has been set to record the operating time on Neil Armstrong's portable life support system. EVA will be counted from that time.

TRANQUILITY This is Neil, how do you read.

CAPCOM Neil, this is Houston. Loud and clear.

TRANQUILITY That's a little bit better now. There we go read you and clear. You're not too loud square, but I think it's the same problem. Houston, how do you read Buzz.

CAPCOM Buzz, this is Houston. Loud and clear, you're really coming in beautifully, over.

TRANQUILITY Very good. Okay. (garbled) repress (garbled).

TRANQUILITY Okay.

END OF TAPE

ARMSTRONG Now - that was for gymnastics.  
ALDRIN What?  
ARMSTRONG Now comes the gymnastics.  
ALDRIN I think it will be a lot easier.  
ARMSTRONG Okay, I want to go to South and go  
down to 3.5 and back to AUTO.  
ALDRIN Okay, going dump -  
ALDRIN And it's down to 4.2 - 4.1.  
ARMSTRONG At 35.  
ALDRIN Are you in AUTO?  
ARMSTRONG Yes. Standby. Cabin pressure at 35  
and lens two circuit pressure between 36 and 43.  
ALDRIN It is -  
ARMSTRONG What?  
ALDRIN The circuits are about to (garbled).  
ARMSTRONG Okay.  
ARMSTRONG Standby for PG and pressures above 45  
minus 46.  
ALDRIN Minus 47.  
CAPCOM Neil this is Houston. Will you give us  
a hack when you set your thermometer, over.  
ARMSTRONG Roger.  
ALDRIN Give it to them later.  
ARMSTRONG Okay.  
ARMSTRONG Okay, lets go to dump.  
ALDRIN Dump - go to dump.  
ARMSTRONG Houston, I'll set my watch at 56, over.  
CAPCOM Roger.  
ALDRIN 3 2 1 mark.  
COLUMBIA Houston, Columbia back on the high  
gain.  
CAPCOM Roger, Columbia. Loud and clear, and  
we copied your mark there Buzz.  
COLUMBIA Clear and we copied your mark there  
Buzz.  
ARMSTRONG (garbled) the window.  
ALDRIN Right away.  
ARMSTRONG Is that yours?  
ALDRIN Got mine.  
ARMSTRONG Okay.  
ARMSTRONG Blood pressure going toward zero.  
There by lens the circuits 36 to 43. That's very fine.  
And my GTA pressure above 4.5. (garbled) above .75, coming  
down. Open hatch when it gets to zero.  
ALDRIN Do you want to bring down one of your  
risers now or leave them up?  
ALDRIN Now read  
ARMSTRONG Okay.  
ARMSTRONG Okay, roger down.  
ARMSTRONG 4/10ths of a pound in the cabin.

APOLLO 11 MISSION COMMENTARY, 7/20/69, CDT 21:25, GET 108:53 335/2

ARMSTRONG Down about .2.  
CAPCOM Coming up on 5 minutes of operation  
on Neil Armstrong's Portable Life Support System now.  
ARMSTRONG It took us a long time to get all the  
way down, didn't it?  
ALDRIN Yes.  
ARMSTRONG You better let me see if it will open  
now,  
ALDRIN Okay.  
ARMSTRONG Open my RCE there, would you mind?

END OF TAPE

ARMSTRONG Push that one.  
ARMSTRONG Is it light?  
ALDRIN It's unlocked, yes.  
ARMSTRONG Unlocked. That's good.  
ARMSTRONG I rig it up.  
ALDRIN It'll pop open.  
ALDRIN Get a steady tone in the background?  
ARMSTRONG I have static.  
ARMSTRONG It went in static.  
ALDRIN I've got a little bit of a steady tone.  
ARMSTRONG I don't guess I hear that.  
CAPCOM Neil, this is Houston. What's your status  
on hatch opening. Over.  
ARMSTRONG Everything is GO here. We're just waiting  
for the cabin pressure to bleed so - to blow enough pressure  
to open the hatch. It's about .1 on our gage now.  
ALDRIN Very dependant on that thing. Alternative  
would be to open Noun 42.  
CAPCOM Neil, this is Houston. Over.  
ARMSTRONG Go ahead, Houston.  
CAPCOM Roger. We're showing a real low static  
pressure on your cabin. Do you think you can open the hatch  
at this pressure of about 1.2 psi?  
ARMSTRONG We're going to try it.  
CAPCOM Roger.  
ARMSTRONG The hatch is coming open.  
ALDRIN Okay, hold it from going closed and I'll  
get the valve 2.  
ARMSTRONG Okay.  
ALDRIN No, I'd better get up first.  
PAO Hatch reported coming open at 109 hours,  
8 minutes, 05 seconds.  
ALDRIN Okay, the valves have gone open.  
ARMSTRONG Okay.  
PAO Correction - 109:07:35.  
ALDRIN Spur up to forward.  
ARMSTRONG The window clank yet? The water went to  
clean yet?  
ALDRIN It was, yes.  
ARMSTRONG Mine, hasn't cleared yet.  
CAPCOM Columbia, this is Houston. Over.  
COLUMBIA You want me? Go ahead.  
CAPCOM Columbia, this is Houston. We'd like you  
to cycle the fans in cryo hydrogen tanks number 1 and LOS  
this orbit is 111:19:31.  
CAPCOM Correction - make that for the next orbit.  
You already have the AOS/LOS for this orbit.  
COLUMBIA Roger on the time and you want to cycle  
the fan in cryo hydrogen tank 1.

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 21:35 GET 109:03 336/2

CAPCOM Roger. Out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-20-69 CDT 21:41 GET 109:09 337/1

EAGLE Open on my request.  
CAPCOM Roger out.  
EAGLE Have you got your water valve on there?  
EAGLE Yes.  
PAO They've been on the PLSS now for 16 and 1/2 minutes.  
CAPCOM Columbia, this is Houston. We show you near the high gain antenna stand limits. When you lose lock on us, we request OMNI DELTA. OMNI DELTA when you lose lock. Over.  
COLUMBIA Roger. OMNI DELTA.  
PAO We're 8 minutes away from loss of signal on Columbia.  
ARMSTRONG Okay. My windows cleared. I'm going to go - turn my cooling up a little bit.  
ALDRIN Okay. My window's clear.  
TRANQUILITY All RCU windows are clear.  
ARMSTRONG (garble) circuit is 42, 43.  
And I got SN pressure light, a BS light and a ECS light.  
ALDRIN We've got a water separator light.  
TRANQUILITY Hold it and I'll check.  
ALDRIN And I'll look at your cabin vent and one (garble) and you look (garble) secondary.  
PAO Neil Armstrong's suit pressure 4. - Is it cool now?  
ARMSTRONG (garble)  
ARMSTRONG Okay. Glycol pump secondary circuit breaker open?  
ALDRIN I can see that.  
ALDRIN I have to lean this way.  
ARMSTRONG I can't go any further. Cabin span 1.  
ALDRIN (garble)  
ARMSTRONG It's open.  
ALDRIN Verified.  
ARMSTRONG Okay. (garble) radar circuit breaker's open.  
ALDRIN I'm looking head on at it. I'll get it.  
ARMSTRONG Okay. You'll have to fix your antenna.

END OF TAPE

ARMSTRONG Well (garbled)  
ALDRIN About ready to go down and get some -  
ARMSTRONG Is my indicator down? Okay, now we're  
ready to hook up the LEC here.  
ALDRIN Now that should go down (garbled) put  
the bag up this way, that's even. Neil are you hooked up to  
it?  
ARMSTRONG Yes.  
ARMSTRONG Okay now we need to hook this.  
ALDRIN Leave that up there.  
ARMSTRONG Yes.  
ALDRIN Okay, your visor. Your back is up  
against the (garbled). Alright now it's on top of the DSKY.  
Forward and up, now you've got them, over toward me, straight  
down, relax a little bit.  
ARMSTRONG (garbled)  
ALDRIN Neil you're lined up nicely. Toward  
me a little bit, okay down, okay made it clear. (garbled)  
ARMSTRONG To what edge?  
ALDRIN Move, here roll to the left, okay  
now you're clear. You're lined up on the platform. Put  
your left foot to the right a little bit. Okay, that's  
good. Roll left.  
ARMSTRONG Okay now I'm going to check these  
bags here.  
ALDRIN Okay, not quite squared away. Roll  
to the, roll right a little. Now you're even.  
ARMSTRONG That's okay?  
ALDRIN That's good. You've got plenty of  
room for your left it's still close on the one that comes  
back.  
ARMSTRONG How am I doing?  
ALDRIN You're doing fine.  
ALDRIN Now do you want those bags?  
ARMSTRONG Yea. Got it.  
ARMSTRONG Okay, Houston, I'm on the porch.  
CAPCOM Roger, Neil.  
ALDRIN Okay right now, Neil.  
CAPCOM Columbia, Columbia, this is Houston  
1 minute and 30 seconds to LOS all systems go, over.  
ALDRIN Stay where you are a minute, Neil  
ARMSTRONG Okay.  
ALDRIN Need a little slack.  
PAO Neil Armstrong on the porch at 109  
hours 19 minutes 16 seconds.  
ARMSTRONG You need more slack, Buzz?  
ALDRIN No hold it just a minute.

ARMSTRONG Okay.

END OF TAPE

ARMSTRONG You need more slack, Buzz?  
ALDRIN No, hold it just a minute.  
ARMSTRONG Okay.  
PAO 25 minutes of PLSS time expended  
now.  
ALDRIN Okay, everything's nice and  
sunny in here.  
ARMSTRONG Okay, can you pull the door open  
a little more?  
ALDRIN (garbled)  
ALDRIN Did you get the mesa out?  
ARMSTRONG I'm going to pull it now.  
ARMSTRONG Houston, the mesa came down  
alright.  
CAPCOM Houston. Roger, we copy, and  
we're standing by for your TV.  
ARMSTRONG Houston, this is Neil. Radio  
check.  
CAPCOM Neil, this is Houston. You're  
loud and clear. Break, break. Buzz, this is Houston. Radio  
check and verify TV circuit breaker in.  
ALDRIN Roger, TV circuit breaker's in.  
Receive loud and clear.  
CAPCOM Man, we're getting a picture  
on the TV.  
ALDRIN Oh, you got a good picture. Huh?  
CAPCOM There's a great deal of contrast  
in it, and currently it's upside-down on our monitor, but we  
can make out a fair amount of detail.  
ALDRIN Okay, will you verify the  
position, the opening I ought to have on the camera.  
CAPCOM Stand by.  
CAPCOM Okay, Neil, we can see you coming  
down the ladder now.  
ARMSTRONG Okay, I just checked - getting  
back up to that first step, Buzz, it's not even collapsed too  
far, but it's adequate to get back up.  
CAPCOM Roger, we copy.  
ARMSTRONG It takes a pretty good little  
jump.  
CAPCOM Buzz, this is Houston. F 2  
1/160th second for shadow photography on the sequence  
camera.  
ALDRIN Okay.  
ARMSTRONG I'm at the foot of the ladder.  
The LM foot pads are only depressed in the surface about  
1 or 2 inches. Although the surface appears to be very,  
very fine grained, as you get close to it. It's almost like  
a powder. Now and then, it's very fine.

ARMSTRONG I'm going to step off the LM now.  
ARMSTRONG That's one small step for man.  
One giant leap for mankind.  
ARMSTRONG As the - The surface is fine  
and powdery. I can - I can pick it up loosely with my toe.  
It does adhere in fine layers like powdered charcoal to the  
sole and sides of my boots. I only go in a small fraction  
of an inch. Maybe an eighth of an inch, but I can see the  
footprints of my boots and the treads in the fine sandy  
particles.  
CAPCOM Neil, this is Houston. We're  
copying.

END OF TAPE

ARMSTRONG There seems to be no difficulty in moving  
around as we suspected. It's even perhaps easier than the  
simulations at 1/6g that we performed in the simulations on  
the ground. It's actually no trouble to walk around. The  
descent engine did not leave a crater of any size. There's  
about 1 foot clearance on the ground. We're essentially on  
a very level place here. I can see some evidence of rays  
emanating from the descent engine, but very insignificant  
amount. Okay, Buzz, we're ready to bring down the camera.

ALDRIN I'm all ready. I think it's been all  
squared away and in good shape. Okay? Okay, you'll have to  
pay out all the LEC. It looks like it's coming out nice and  
evenly.

ARMSTRONG Okay, it's quite dark here in the shadow  
and a little hard for me to see if I have good footing. I'll  
work my way over into the sunlight here without looking directly  
into the sun.

ALDRIN Okay, it's taut now.

PAO Unofficial time on the first step -  
109:24:20.

ALDRIN Yes, I think it's pulling the wrong one.

ARMSTRONG Okay, I'm with you. Pull it down now.  
There was still a little bit left in the -

ALDRIN Okay, don't hold it quite so tight.  
Okay?

ARMSTRONG Looking up at the LM, I'm standing directly  
in the shadow now looking up at Buzz in the window. And I  
can see everything quite clearly. The light is sufficiently  
bright, backlighted into the front of the LM, that everything  
is very clearly visible.

ALDRIN Okay, I'm going to be changing this hook  
hanger.

ARMSTRONG Okay.

PAO The Surgeon says that -

ARMSTRONG Camera installed on the RCU bracket.

PAO The Surgeon says the crew is doing well.

Data is good, crew is doing well.

ARMSTRONG I'm storing the LEC on the secondary strut.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 109:30, CDT 22:02, 341/1

ARMSTRONG  
first pictures here.

I'll step out and take some of my

CAPCOM  
and clear. We see you getting some pictures and the contingency sample.

Roger, Neil, we're reading you loud

ALDRIN  
contingency sample.

He's getting some pictures and the

PAO  
expended now.

35 and a half minutes of PLSS time

CAPCOM  
about the contingency sample, over.

Neil this is Houston. Did you copy

ARMSTRONG  
as soon as I finish these picture series.

Rog, I'm going to get to that just

ALDRIN  
sample now, Neil.

Okay, going to get the contingency

ARMSTRONG

Right.

ALDRIN  
sample is down and it's (garbled). Looks like it's a little difficult to dig through -

Okay, that's good. Okay the contingency

ARMSTRONG  
a very soft surface but here and there where I plug with the contingency sample collector, I run into a very hard surface but it appears to be very cohesive material of the same sort. I'll try to get a rock in here. Here's a couple.

END OF TAPE

ARMSTRONG A couple.  
ALDRIN That looks beautiful from here, Neil.  
ARMSTRONG It has a stark beauty all its own. It's like much of the high desert of the United States. It's different but it's very pretty out here. Be advised that a lot of the rock samples out here, the hard rock samples have what appear to be vesicles in the surface. Also I am looking at one now that appears to have some sort of phenocryst.  
CAPCOM Houston. Roger, out.  
ALDRIN Container handle is off the (cut out) - in about six or eight inches under the surface. I could (cut out)  
ARMSTRONG It is. It's - I'm sure I could push it in further, but it's hard for me to bend down further than that.  
ALDRIN Now you can -  
ARMSTRONG You can really throw things a long way out there. That pocket open, Buzz?  
ALDRIN Yes it is, but it's not up against your suit. Hit it back once more. More toward the inside. Okay, that's good.  
ARMSTRONG That in the pocket?  
ALDRIN Yes, push down. Got it? No, it's not all the way in. Push it. There you go.  
ARMSTRONG Contingency sample is in the pocket. I - Oxygen is 81 per cent. I have no flags, and I'm in minimum flow.  
CAPCOM This is Houston. Roger and out.  
ALDRIN Okay. I have got the cameras on at one frame a second  
ARMSTRONG Okay.  
ALDRIN And I've got the 80 per cent, no flags.  
ARMSTRONG Are you getting a TV picture now, Houston?  
CAPCOM Neil, yes we are getting a TV picture.  
Neil, this is Houston. We're getting a picture here. It's the first time we can see the bag on the LEC being moved by Buzz, though. Here you come into our field of view.  
ARMSTRONG (Garble).  
ALDRIN Roger.  
ARMSTRONG Hold it a second. First let me move that over the edge for you.  
ALDRIN Okay. Are you ready for me to come out?  
ARMSTRONG Yes. Just stand by a second. I'll move this over the handrail. Okay?  
ALDRIN Alright. That's got it. Are you ready?  
ARMSTRONG All set. Okay, you saw what difficulties I was having. I'll try to watch your PLSS from underneath here.  
ALDRIN Alright. The backup camera is -

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 109:39, CDT 22:11 343/1

ALDRIN - all right the back up camera's position.  
ARMSTRONG Okay. Your PLSS is - looks like it is clearing okay. The shoes are about to come over the sill. Okay, now drop your PLSS down. There you go you're clear and spiderly you're good. About an inch clearance on top of your PLSS.

ALDRIN Okay, you need a little bit of arching of the back to come down. (Garbled) How far are my feet from the -  
ARMSTRONG Okay, you're right at the edge of the porch.

ALDRIN Okay. Back in - all little of foot movement - porch. Little arching of the back. Hope it comes up and cleared the bulk head without any trouble at all.

ARMSTRONG Looks good.  
PAO 45 minutes PLSS time expended.  
CAPCOM Neil, this is Houston. Based on your camera transfer with the LEC do you foresee any difficulties in SRC transfer? Over.

ARMSTRONG Negative.  
PAO It's the sample return containers, the rock boxes that CAPCOM -  
ALDRIN Now, I want to back up and partially close the hatch. Making sure not to lock it on my way out.

ARMSTRONG A good thought.  
ALDRIN That's our home for the next couple of hours and I want to take good care of it. Okay, I'm on the top step and I can look down over the RCU, landing gear pads. That's a very simple matter to hop down from one step to the next.

ARMSTRONG Yes, I found it to be very comfortable and walking is also very comfortable. You've got three more steps and then a long one.

ALDRIN Okay, I'm going to leave that one foot up there and both hands down to about the fourth rung up.  
ARMSTRONG There you go.  
ALDRIN Okay. Now I think I'll do the same.  
ARMSTRONG A little more. About another inch. There you got it. That's a good step. About a three footer.  
ALDRIN Beautiful, beautiful.  
ARMSTRONG Isn't that something. Magnificent sight down here.  
ALDRING Magnificent definition.  
PAO Both PLSS's nominal on consumables.  
ALDRIN Looks like the secondary strut has little thermal effects on it right here, Neil.  
ARMSTRONG Yeah, I noticed that. That seems to be the worst although similar effects are on - all around.  
ALDRIN Both talking at once. - isn't it.

APOLLO 11 MISSION COMMENTARY, 7/20/69, GET 109:39, CDT 22:11 343/2

ARMSTRONG                    Isn't it fun.  
Aldrin                        Right in this area I don't think there's  
much of any (cut out) bounce together and it's hard to tell  
whether it's a cloud or a rock.

ARMSTRONG                    Notice how you can pick it up.

ALDRIN                        . Yeah it bounces and then

END OF TAPE

ALDRIN Reaching down fairly fast, getting my suit dirty at this stage.

ARMSTRONG The mass of the backpack does have some effect on inertia.

ALDRIN There's a slight tendency I can see now to - backwards - due to the soft, very soft texture.

ARMSTRONG You're standing on a rock, a big rock there now.

ALDRIN This pad sure didn't.

ARMSTRONG No, it didn't.

ALDRIN There's no crater there at all from the engine.

ARMSTRONG No.

ALDRIN I wonder if that right under the engine is where the probe might have hit.

ALDRIN - side like that.

ARMSTRONG Yes, I think that's a good representation of our sideward velocity at touchdown there.

ALDRIN I see that probe over on the minus Y strut. It's broken off and bent back up.

ARMSTRONG (Garbled) bent over.

ALDRIN Can't say too much for the - for the visibility here without the visor up. (Garbled) it looks like there is a (garbled) the surface of it is not bound in rock. And incidently, these rocks - a very powdery surface.

CAPCOM Try again please Buzz, you're cutting out.

ALDRIN I say that the rocks are rather slippery.

CAPCOM Roger.

ALDRIN Very powdery surface when the sun hits. They split up all the very little fine porouses. We will attempt to slide over it rather easily.

CAPCOM Neil Armstrong getting ready to move the TV camera now out to it panorama position.

ARMSTRONG Traction

ALDRIN (garbled)

ALDRIN About to lose my balance in one direction and recovery is a (garbled). And moving arms around Jack doesn't (garbled) the surface. Not quite that light footed.

ARMSTRONG And I have the insulation off the MESA now and MESA seems to be in good shape.

ALDRIN Got to be careful that you are leaning in the direction you want to go otherwise you (garbled). In other words, you have to cross your foot over to stay underneath where your center of mass is. And Neil, didn't I say we might see some purple rocks?

ARMSTRONG Find the purple rocks?

ALDRIN Yes. They are small, sparkly (garbled) are the box.

END OF TAPE

ARMSTRONG - find the purple rocks?  
ALDRIN No. Pretty small sparkly (cut out) -  
fragments (cut out) - on in places (cut out) - I would take a  
first guess, some sort of biotite. We'll leave that to the  
Lunar Analysis, but (cut out).  
ARMSTRONG Bio compacts underneath (cut out)-  
completely (cut out) - no, I say you don't sink down more than  
a quarter of an inch.  
PAO Biotite is a brown mica substance.  
ARMSTRONG Okay, Houston. I'm going to change lenses  
on you.  
CAPCOM Roger, Neil.  
PAO Life Support Consumables still looking good.  
ARMSTRONG Okay, Houston. Tell me if you're getting  
a new picture.  
CAPCOM Neil, this is Houston. That's affirmative.  
We're getting a new picture. You can tell it's a longer focal  
length lens, and for your information, all LM systems are GO.  
Over.  
ARMSTRONG We appreciate that. Thank you.  
ALDRIN Neil is now unveiling the plaque (cut out) -  
CAPCOM Roger. We got you fore-sighted but  
back under one track.  
ARMSTRONG For those who haven't read the plaque,  
we'll read the plaque that's on the front landing gear of this  
LM. First there's two hemispheres, one showing each of the  
two hemispheres of the Earth. Underneath it says " Here Man  
from the planet Earth first set foot upon the Moon, July 1969 A.D.  
We came in peace for all mankind." It has the crew members'  
signatures and the signature of the President of the United States.  
Ready for the camera? I can -  
ALDRIN No, you take this (garble)  
ARMSTRONG That's the LEC length.  
ALDRIN Now I'm afraid these barbed materials are  
going to (cut out) - The surface material is powdery, but (cut out) -  
how good your lens is, but if you could (cut out). Very much  
like a very finely powdered carbon, but it's very pretty looking.  
ARMSTRONG Do you want to pull out some of my cable  
for me, Buz?

END OF TAPE

ARMSTRONG - - my cable for me?  
ALDRIN Houston. How close are you  
able to get things in focus?  
CAPCOM This is Houston. We can see  
Buzz's right hand. It is somewhat out of focus. I'd say  
we're approaching down to probably about 8 inches to a foot  
behind the position where he is pulling out the cable.  
ALDRIN Okay. Let's have the temperature  
from you.  
CAPCOM Temperature of the cabin is  
showing 0.  
ALDRIN I'm a little cool. I think  
I'll (garbled).  
ALDRIN I'm on immediate now Houston, and  
I show 3.78. 5, 7 - -  
CAPCOM Houston. Roger. Out.  
ALDRIN And, we'll probably need a  
little (garbled) back location television camera.  
ALDRIN Neil, look at the minus (garbled)  
The direction you travel at from right to left.  
ARMSTRONG Right.  
ALDRIN This one over here underneath  
the ascent engine. It has a broken front tip. (garbled)  
ARMSTRONG Have I got plenty of cable?  
ALDRIN You've got plenty.  
ALDRIN Okay. I think I've got the  
end of it.  
ARMSTRONG Something interesting. In the  
bottom of this little crater here. It may be - -  
ALDRIN Keep going. We've got a lot  
more.  
ARMSTRONG Okay.  
ALDRIN Being a little harder to pull  
out here.  
PAO If you stand on the ladder  
facing forward, the minus Y strap is the landing gear to  
your left.  
ARMSTRONG Afraid I am, Buzz.  
ALDRIN 40, 50 feet. Why don't you  
turn around and let them get a view from there and see  
what the field of view looks like.  
ARMSTRONG Okay.  
ALDRIN You're backing into the cable.  
ARMSTRONG Okay.  
ALDRIN Turn around to your right I think,  
would be better.  
ARMSTRONG I don't want to go into the  
sun if I can avoid it.  
ALDRIN That's right, Neil.

ARMSTRONG I just (garbled) and walk  
around it.

ALDRIN Houston. How's that field  
of view going to be except the mesa? All right?

CAPCOM Good.

CAPCOM Neil, this is Houston. The  
field of view is okay. We'd like you to aim it a little  
more to the right. Over.

ARMSTRONG Okay.

ALDRIN Okay, that's all the cable  
we have. We're going out. I'll start working on - -

CAPCOM A little bit too much to the  
right. Can you bring it back about 4 or 5 degrees?

CAPCOM Okay. That looks good Neil.

ARMSTRONG Okay, now. Do you think I ought to be  
farther away or closer?

ALDRIN Can't get too much further either  
way.

ARMSTRONG Let's try it like that for a  
while. I'll get a couple of panoramas with it, too.

CAPCOM Roger. You look as far as  
distance goes, Neil. And, we'll line you up again when  
you finish the panorama. Now, you're going too fast on  
the panorama sweep. You're going to have to stop for it.

ARMSTRONG I haven't stopped - I haven't  
set it down yet. That's the first picture in the panorama  
right there.

CAPCOM Roger.

ARMSTRONG It's taken (garbled) about  
north, northeast.

END OF TAPE

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ARMSTRONG - thinking about north or northeast.  
Tell me if you've got a picture, Houston.  
CAPCOM We've got a beautiful picture, Neil.  
ARMSTRONG Okay. I'm going to move it.  
CAPCOM Okay, here's another good one. Okay,  
we got that one.  
ARMSTRONG Okay, now this one is right down front  
straight west and I want to know if you can see an angular  
rock in the foreground.  
CAPCOM Roger, we have a large angular rock in  
the foreground and it looks like a much smaller rock a couple  
of inches to the left of it. Over.  
ARMSTRONG All right and then on beyond it about  
10 feet is an even larger rock that's very rounded. That  
rock is about - the closest one to you is about sticking  
out of the sand about 1 foot and it's about a foot and one-  
half long and it's about 6 inches thick but it's standing  
on edge.  
CAPCOM Roger.  
ALDRIN Okay, Neil, I've got the table out and  
the pack deployed.  
CAPCOM We've got this view now.  
ARMSTRONG Straight south.  
CAPCOM Roger, and we see the shadow of the LM.  
ARMSTRONG Roger, the little hill just beyond the  
shadow of the LM is a pair of elongated craters about - that  
will be the pair together is 40 feet long and 20 feet across  
and they're probably 6 feet deep. We'll probably get some  
more work in there later.  
CAPCOM Roger. We see Buzz going about his work.  
ARMSTRONG How's that for a final.  
CAPCOM For a final orientation, we'd like it  
to come left about 5 degrees. Over. Now back to the right  
about half as much.  
ARMSTRONG Okay?  
CAPCOM Okay. That looks good there, Neil.  
ARMSTRONG Okay.  
PAO 1 hour, 7 minutes time expended.  
ARMSTRONG Okay, you can make a mark, Houston.  
CAPCOM Roger.  
ARMSTRONG And incidently you can use the shadow  
that the staff makes to (garble).  
PAO Buzz is erecting the solar wind experiment  
now.  
ALDRIN Some of these small depressions (garbled)  
3 inches. I could suggest exactly what the surveyor pictures  
showed when they pushed away a little bit. You get a force  
transmitted through the upper surface of the soil and about  
5 or 6 inches of bay breaks loose and moves as if it were

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ALDRIN caked on the surface when in fact it  
really isn't.  
ARMSTRONG I notice in the soft spots where we have  
foot prints -

END OF TAPE

ALDRIN -- were taped on the surface when, in fact it really isn't.

ARMSTRONG I noticed in the soft spot where we had foot prints nearly an inch deep that the soil is very cohesive and it will retain a - slope of probably 70 degrees (cut out) foot prints.

PAO All LM systems still looking good.

ARMSTRONG Okay?

ALDRIN Yes. I think that's excellent.

ALDRIN That didn't come out?

ALDRIN (garble)

ARMSTRONG It's up front. Come out here with me. (garble)

ALDRIN You'll have to extend that one.

CAPCOM Columbia. Columbia. This is Houston.

AOS.

COLUMBIA Houston. AOS.

PAO Neil Armstrong has been on the lunar surface now almost 45 minutes.

COLUMBIA Houston. Columbia in high gain.

Over.

CAPCOM Columbia. This is Houston reading you loud and clear. Over.

COLUMBIA Yes. This is History.

Yes. Read you loud and clear. How's it going?

CAPCOM Roger. The EVA is progressing beautifully. I believe they are setting up the flag now.

COLUMBIA Great.

CAPCOM I guess you're about the only person around that doesn't have TV coverage of the scene.

COLUMBIA That's right. That's all right.

I don't mind a bit. How is the quality of the TV?

CAPCOM Oh, it's beautiful, Mike. Really is.

COLUMBIA Oh, gee, that's great. Is the lighting half way decent?

CAPCOM Yes, indeed. They've got the flag up and you can see the stars and stripes on the lunar surface.

COLUMBIA Beautiful. Just beautiful.

ARMSTRONG That's good. See if you can pull that end to pop open. Take that end emblem.

ALDRIN It won't pull out. Okay.

CAPCOM Neil. This is Houston. Radio check.

Over.

ARMSTRONG Roger. Houston. Loud and clear.

CAPCOM Roger. Out.

ALDRIN Loud and clear, Houston.

CAPCOM Roger, Buz.

ALDRIN I'd like to evaluate the various phases that a person can - traveling on the lunar surface. I believe I'm out of your field of view. Is that right, --

ARMSTRONG

- - Tom, Houston?

CAPCOM

That's affirmative, Buz.

CAPCOM

You are now in our field of view.

ALDRIN

You do have to -

CAPCOM

You're in our field of view.

ALDRIN

Okay. You do have to be rather

Careful to keep track of where your center of mass is. Sometimes, it takes about 2 or 3 paces to make sure you've got your feet underneath you. About 2 to 3 or maybe 4 easy paces can bring you to a nearly smooth stop. Next direction like a football player, you just have to split out to the side and cut a little bit. One called a kangaroo hop does work but it seems that your forward ability is not quite as good.

END OF TAPE

ARMSTRONG kangaroo hop. It does work, but it seems that your forwardability is not quite as good as it is in the conventional or conventional one foot after another. It's hard to say what a strained pace might be. I think it's one that I'm using now. Could get rather tiring after several hundred - But this may be a function of this suit, as far as lack of gravity forces.

CAPCOM Tranquility Base, this is Houston. Could we get both of you on the camera for a minute, please?

ARMSTRONG Say again, Houston.

CAPCOM Roger. We'd like to get both of you in the field of the view of the camera for a minute.

CAPCOM Neil and Buzz, the President of the United States is in his office now and would like to say a few words to you. Over.

ARMSTRONG That would be an honor.

CAPCOM Go ahead Mr. President, this is Houston. Out.

PRES NIXON Neil and Buzz, I am talking to you by telephone from the Oval Room at the White House. And this certainly has to be the most historic telephone call ever made. I just can't tell you how proud we all are of what you ... for every American, this has to be the proudest day of our lives. And for people all over the world, I am sure they, too, join with Americans, in recognizing what a feat this is. Because of what you have done, the heavens have become a part of man's world. And as you talk to us from the Sea of Tranquility, it inspires us to double our efforts to bring peace and tranquility to earth. For one priceless moment, in the whole history of man, all the people on this earth are truly one. One in their pride in what you have done. And one in our prayers, that you will return safely to earth.

ARMSTRONG Thank you, Mr. President. It's a great honor and privilege for us to be here representing not only the United States but men of peace of all nations. And with interest and a curiosity and a vision for the future. It's an honor for us to be able to participate here today.

PRES NIXON And thank you very much and I look forward - all of us look forward to seeing you on the Hornet on Thursday.

ARMSTRONG Thank you.

ALDRIN I look forward to that very much, sir.

CAPCOM Columbia, Columbia, this is Houston. Over.

COLUMBIA Loud and clear, Houston.

CAPCOM Roger. I got a B22 auto optics - auto optics pad for you.

COLUMBIA Ready to go ahead.

CAPCOM Roger. P22 landmark ID, LM T1, 110, 26, 56. T2, 110, 32, 06, 3 miles south. Time of closest approach, 110, 33, 40. Shaft, 353.855. Trunnion, 46.495. Roll, 0. Pitch, 250. Yaw, 0. Over.

END OF TAPE

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CAPCOM - roll zero, pitch 250, yaw zero. Over.  
COLUMBIA Roger. Thank you. You read back very clear.

CAPCOM Roger. Out.

ALDRIN Houston, it's very interesting to note that when I kick my foot (cut out) - there's no atmosphere here, and this gravity (cut out) - they seem to leave, and both of them have about the same angle of departure and velocity. From where I stand, a large portion of them will know by impact that they're a good two thousand. Several - the percentage is, of course, is ruled by impact. Different reasons (cut out) - it's highly dependent upon depth, the initial trajectory upward, where most of the - already the particles are found especially strange.

CAPCOM Roger, Buz. And break, break, Columbia, this is Houston. When you track out of high gain antenna, then let's request OMNI Delta, OMNI Delta. Over.

COLUMBIA I'm in.

ARMSTRONG I noticed several times in going from the sunlight into the shadow that just as I go in, there's an additional reflection off the LM that - along with the reflection off my face onto the visor - makes visibility very poor just at the transition - Sunlight into the shadow. I think we have so much glare coming off of my visor, that my (cut out) - no one actually gets on. Then it takes a short while for my eyes to adapt to the lighting conditions. But this time the (garble).

ALDRIN Yes. Visibility, as we said before, is not too great, but both visor's up. (Garble). What sort of footprints we have in the (Garble).

ARMSTRONG Then after being out in the sunlight a while, it takes - Buz, you're nearly on the cable.

ALDRIN Okay.

ARMSTRONG Lift up your right foot, right foot. Your toe is still hooked in it.

ALDRIN That one?

ARMSTRONG Yes, it's still hooked in it. Wait a minute. Okay, you're clear now.

ALDRIN Thank you.

ARMSTRONG Now, let's move that over with me.

PAO Neil Armstrong has the scoop for the bulk sample collection.

ALDRIN The blue color of my boot has completely disappeared now into this - still don't know exactly what color to describe this other than ash-cocoa color. It appears to be covering most of the lighter part of the boot (Garble) very fine particles (Garble).

CAPCOM Buz, this is Houston. You're cutting out on the end of your transmissions. Can you speak a little more forward into your microphone. Over.

ALDRIN Roger. I'll try that.  
CAPCOM Beautiful.  
ALDRIN Now I had that one inside my mouth that  
time.  
CAPCOM It sounded a little wet.  
PAO Neil's been on the surface a hour now.  
Buz not quite twenty minutes; less than that.  
ALDRIN In general, time spent in the shadow  
doesn't seem to have any (cut out) effects. (Cut out) inside  
the suit. There is a difference, of course, in the coming  
radiation and the helmet. So I think there's a tendency to  
feel a little poor in the data (Garble).  
CAPCOM Columbia, this is Houston. Over.  
PAO One hour and a half expended on the  
PLSS's now.  
CAPCOM Columbia, this is Houston. Over.  
CAPCOM Columbia, this is Houston. Over.  
COLUMBIA Houston, coming in Delta.  
CAPCOM Roger. You should have VHF AOS with  
the LM right about now with VHF LOS will be about 40 minutes  
15 seconds. Over.  
COLUMBIA Thank you.  
PAO Heart rates on both crewmen have been  
averaging between 90 and 100. Flight surgeon reports they're  
right on the predicted number of the Btu units expended in  
energy of work. And he thinks they're in great shape.  
ARMSTRONG As I look around the area, the contrast  
in general is - comes about completely by virtue of the data  
(Garble)- down sun through a very, very light-colored gray,  
light gray color. A halo around my own shadow, around the  
shadow of my helmet. Then as I look off across, the contrast  
becomes (Garble) in that the surrounding color is still fairly  
light as you look down into the sun. A larger amount (cut out)  
of that area is looking toward us. The general color of the  
(cut out) dark area, without sun, the contrast is not as big.  
Surveying of all the dusty area that we've picked up, considerably  
darker in (Garble)

END OF TAPE

ALDRIN - - considerably darker in texture. Now, I've picked up one and I imagine that this is (garbled) survey along the area that we're walking. This is due to the fact that there are footprints there. General terrain where I've been out on this surface, there is generally of a darker contrast in the color.

PAO You can Neil Armstrong bringing scoop - -

ARMSTRONG - - about 30 or 40 feet out.

ALDRIN - - the plus V strap.

CAPCOM Roger.

ALDRIN Right in this area, there are two craters. The one that's right in front of me now - they look in about the 11 o'clock position from the spacecraft. About 30 to 35 feet apart. There's several rocks and boulders about 6 to 8 inches across (garbled).

PAO Neil is filling the bulk sample bag attached to a scale as seen in the picture. Buzz is behind the LM at the minus Z strut. That's the landing gear directly opposite the ladder. Neil's been on the surface about an hour and 10 minutes.

ARMSTRONG I'm now in the area of the minus Y strut taking some photographs.

END OF TAPE

PAO Buzz is making his way around the LM photographing it from various angles, looking at its condition on all sides. Neil still occupied with the bulk sample. 1 hour 40 minutes time expended on the PLSS's now.

ALDRIN How's the bulk sample coming Neil?

ARMSTRONG Bulk sample is (garble) sealed.

COLUMBIA Houston, Columbia.

CAPCOM Columbia, this is Houston. Go ahead.

Over.

COLUMBIA Roger. No marks on the LM that time. I can see a suspiciously small white object - the coordinates are -

CAPCOM Go ahead with the corrdinates on the small white object.

COLUMBIA (Garbled) .3, 7.6 but I (garbled) right on the southwest end of a crater. I think they would know it if they were in such a location. It looks like their LM would be is pitching up quite a degree. It's on the southwest wall of the far crater.

CAPCOM Roger, copy echo decimal 3 and 7 decimal 6 and -

CAPCOM Columbia, this is Houston while I'm talking to you; LOS will be at 111:19:31; AOS 112:05:43. Over. Columbia, this is Houston. Did you copy LOS, AOS times? Over.

COLUMBIA Negative Houston. You broke just in time to where I couldn't run up the flight plans.

CAPCOM Roger out.

END OF TAPE

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ALDRIN The docked deflector that's mounted on quad 1 seems to be a good bit more wrinkled (garbled) on quad 4.

CAPCOM You're breaking up again, Buzz.

ALDRIN I say the jets deflector that's mounted on quad 4 seems to be - the surface of it seems to be more wrinkled than the one that's on quad 1. Generally underneath part of the LM seems to have stood up quite well to the (garbled) get some pictures in the aft part of the LM that will illuminate the thermal effects much better than we could get them up here at the front.

CAPCOM Roger, out.

ALDRIN We're going to get some particular photographs of the bulk sample area in the LM.

CAPCOM Okay.

ALDRIN And Houston, Buzz here. I'm showing 3.78 psi, (garbled)

ARMSTRONG Roger, and Neil here is 66 percent O<sub>2</sub>, no flags, minimum cooling and the suit pressure is 382.

CAPCOM Houston. Roger, out.

PAO Neil has finished collecting and packing the bulk sample.

CAPCOM Buzz, this is Houston. Have you removed the close up camera from the MESA yet? Over.

ALDRIN Negative, thank you. You should get the panorama view.

ARMSTRONG Okay.

ALDRIN Did you get it?

ARMSTRONG Houston, how does our time line seem to be going?

CAPCOM Roger. It looks like you're about a half hour slow on it. We're working on consumables, over.

ARMSTRONG All right.

CAPCOM Neil and Buzz, this is Houston. To clarify my last -

END OF TAPE

CAPCOM Neil and Buzz, this is Houston. To clarify my one, your consumables are in good shape at this time. The 30 minutes difference was respectively nominal time line. Over.

ALDRIN I can understand that.

PAO Neil's been on the surface now slightly over an hour and 20 minutes.

ARMSTRONG I don't note any abnormalities in the LM. The pods seem to be in good shape. The primary and secondary struts are in good shape. Antennas are all atrace. There's no evidence of problem underneath the LM due to engine fault or drainage of any kind.

CAPCOM Roger. Out.

ALDRIN It's very surprising, the surprising lack of penetration of all four of the foot pads. I'd say if we had gone farther below the surface, they would have penetrated maybe another three inches. Wouldn't you say, Neil?

ARMSTRONG At the most, yes. But, I could tell they settled even less than that.

ARMSTRONG (garbled)

ALDRIN I get a picture of the XY strut taken from near the descent stage, and I think we'll be able to see better what the facts are. Seem to be quite minimum.

ALDRIN There's one picture taken in the right rear of the spacecraft looking at the skirts of the descent stage. Quite darkening of the surface color. A rather minimum amount of radiating, edging away, or erosion of the surface. On descent, both of us remarked that we could see a very large amount of very fine dust particles moving about. It was reported beforehand that we would probably see enough gassing from the surface after engine shutdown, but as I recall, I was unable to find that.

END OF TAPE

ALDRIN This is too big an angle, Neil.  
ARMSTRONG Yes, I think you are right.  
ARMSTRONG We're back at the minus Z strut now.  
There you (garbled) very little force of impact that we  
actually had.  
ALDRIN And Neil, if you pick the camera holder  
to work on the (garbled).  
ARMSTRONG Okay.  
CAPCOM Columbia, Columbia this is Houston.  
ALDRIN I notice that -  
CAPCOM Go ahead Buzz.  
ALDRIN Taking some close-up pictures of that  
rock.  
ARMSTRONG I was saying that Houston - stop and  
take a photograph or something and then want to start moving  
again sideways inspite of a tendancy to start doing it with  
just gradual sideways hops until you start getting (garbled).  
CAPCOM Roger.  
ARMSTRONG Can you see us underneath the LM over  
at the SEQ Bay, Houston?  
CAPCOM Yes indeed Buzz. We can see your feet  
sticking out underneath the structure of the LM descent stage.  
ARMSTRONG Okay, I'm just on the other side of  
the -  
CAPCOM Now we can see you through the structure  
of the minus Z secondary strut.  
PAO The SEQ Bay contains the scientific  
experiments to be left on the surface of the moon; the laisor  
reflector.  
CAPCOM They're open and it looks like they  
are going to stay up without any problem.  
CAPCOM Columbia, Columbia this is Houston.  
We are about to lose you on the OMNI's. Request high gain  
antenna. React mode fish 20, yaw 135. Over.  
ALDRIN Gonna pick an area, Neil?  
CAPCOM Make that yaw 175, Columbia yaw 175  
on the high gain.  
COLUMBIA (garbled) on the high gain Houston.  
CAPCOM Roger, out.  
PAO The surgeon says everything looks fine.

END OF TAPE

PAO An hour and a half of lunar surface time for Neil Armstrong.

ALDRIN Houston. The passive seismometer has been deployed manually.

CAPCOM Roger.

PAO They've been in the portable life support systems for 2 hours now.

ARMSTRONG The manual deployment of the LR cubed. The spring that is at the end of the string pulled off of the picks head; however, I'm able to reach up and get hold of the picks head and pull it loose. It will be deployed manually, also.

CAPCOM Roger.

ARMSTRONG And, the panorama is complete and LM - got the LM at 7:30 position at about 60 feet.

PAO That's Neil Armstrong to the left of the screen. That - -

ARMSTRONG Doors are closed and locked.

CAPCOM Roger.

CAPCOM Have you got us a good area picked out?

ARMSTRONG Yes. I think out on that rise out there is as good as any. I'll probably stay on the high ground there and - -

ALDRIN Right at the edge of that crater drops - -

ARMSTRONG Kind of a drop-off, isn't it?

ALDRIN Take a couple of close-ups on these big round and large boulders.

PAO Buzz Aldrin coming into view on the right carrying the two experiments.

ARMSTRONG About 40 feet out - I'd say out at the end of that next - -

ALDRIN It's going to be a little difficult to find a good level spot here.

ARMSTRONG What about next to the ridge there. Wouldn't that be a pretty good place?

ALDRIN All right. Should I put the LR cubed vehicle here?

ARMSTRONG All right.

ALDRIN Bring it up on the other side of this rock here.

ARMSTRONG I would go right around that crater to the left there. Isn't that a level spot there?

ALDRIN It's slanting just a little.

PAO And, they will be out of the cameras field of view while setting up these experiments.

END OF TAPE

PAO - - while setting up these experiments.  
ARMSTRONG These boulders look like basalt and they have probably a 2 percent white minerals in them, the white crystals. And the thing that I reported as the vesicular before, I'm not - I don't believe I believe that any more - I think that small craters - they look like little impact craters where shot - BB shot has hit the surface.  
ALDRIN Houston. I have the seismic experiment flipped over now and I'm combining it, but I'm having a little bit of difficulty getting the BB up in the center. It wants to move around and around on the outside. (cut out)  
CAPCOM You're cutting out again, Buz.  
ALDRIN I say I'm not having too much success in leveling the PSE experiment.  
ARMSTRONG The laser reflector has been installed and the bubble is leveled and the alignment seems to be good.  
CAPCOM Neil. This is Houston. Roger. Out.  
ALDRIN Hey. You want to take a look at this BB and see what you make out of it?  
ARMSTRONG I find it pretty hard to get perfectly level, too.  
ALDRIN That BB likes the outside. It won't go on the inside.

END OF TAPE

ARMSTRONG - but a little cup is convex now  
instead of concave.

ALDRIN I think you're right.

ARMSTRONG Believe it is.

ALDRIN Houston, I don't think there's any  
hope for using this leveling device to come up with an accurate  
level. It looks to me as though the cup here that the bubble is  
in is now convex instead of concave. Over.

CAPCOM Roger, 11. Press on. If you think you  
can level by eyeball, go ahead.

ALDRIN Okay.

PAO The bubble they're discussing is on a  
leveling device on the passive seis monitor.

ARMSTRONG (Garble) Thank you. Good work.

ALDRIN Thank you.

ARMSTRONG Hey, stop, stop. Back up.

ALDRIN Houston, the dial of spacing the PSC,  
the right-hand solar ray deployed automatically. The left-hand  
I had to manually - bending the bar at the far end. All parts  
of the solar ray are clear on the ground now.

CAPCOM Buz, this is Houston. I understand that  
you did successfully deploy both solar rays. Over.

ALDRIN Roger. That's affirmative. I don't  
have any way of telling whether that's lined up. I'd get -  
no, well maybe I can get down here. Neil, how does that seem  
to be pointing?

CAPCOM Neil, this is Houston. Over.

ARMSTRONG Go ahead, Houston. Over. Go ahead.,  
Houston.

CAPCOM Roger. We've been looking at your  
consumables, and you're in good shape. Subject to your  
concurrence, we'd like to extend the duration of the EVA  
15 minutes from nominal. We will still give Buz a hatch at  
10 minutes for heading in. Your current elapsed time is  
2 plus 12. Over.

ARMSTRONG Okay. That sounds fine.

CAPCOM Roger. Out.

PAO Two twelve is the time expended on the  
PLSS.

CAPCOM This is Houston. If you're still in  
the vicinity of the PSC, could you get a photograph of the  
moral rubble. Over.

ARMSTRONG I'll do that, Buz.

ALDRIN Right. We'll get a photograph of that.  
Houston, what time would you estimate we could allow for the  
documented sample. Over.

ARMSTRONG Oh, shoot. The grain of the ball is  
right in the middle now.

ALDRIN Wonderful. Take a picture before it moves.

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CAPCOM Neil, this is Houston. We're estimating about 10 minutes for the document sampling. Over.

CAPCOM Columbia, Columbia, this is Houston. Over.

COLUMBIA Go ahead, Houston, Columbia.

CAPCOM Roger. Like you to terminate charging battery BRAVO at 111 plus 15. Over..

END OF TAPE

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ARMSTRONG How late are we now?

CAPCOM Roger. Buzz, this is Houston. You've got about 10 minutes left now prior to commencing your EVA termination activities, over.

ALDRIN Roger, I understand.

CAPCOM Tranquillity Base, this is Houston. The passive seismic experiment has been uncaged and we're observing short period oscillations yet. Over.

PAO Neil Armstrong has been on the surface now about an hour and fifty minutes. In the foreground Buzz Aldrin is collecting a core tube sample.

ALDRIN I hope you're watching how hard I have to hit this into the ground to the tune of about 5 inches Houston.

CAPCOM Roger.

ALDRIN It almost looks wet.

END OF TAPE

ARMSTRONG - - got a sample.  
ARMSTRONG Wait a minute. Wait a minute.  
Cut the cable again.  
CAPCOM Neil and Buzz, this is Houston.  
ALDRIN Wait a minute.  
ARMSTRONG That's it?  
ALDRIN Not quite.  
CAPCOM Neil, this is Houston. We  
would like you all to get two core tubes and the solar wind  
experiment. Two core tubes and the solar wind. Over.  
ARMSTRONG Roger.  
PAO The core tubes provide material - -  
ALDRIN Get the next one. Maybe you  
can clear away the rocks a little bit.  
ARMSTRONG Hope I can.  
CAPCOM Buzz, this is Houston. You  
have approximately three minutes until you must commence  
EVA termination activities. Over.  
ALDRIN Roger. Understand.  
CAPCOM Columbia. This is Houston.  
You have approximately 1 minute to LOS. Over.  
COLUMBIA Copy. Roger.  
CAPCOM And, do you plan on commencing  
your sleep on the back side this pass? If so, we'll disable  
uplink to you while we're talking to the LM. Over.  
COLUMBIA Negative that.  
ALDRIN Houston. Were you able to  
record the documentary when the two tube samples were  
taken?  
CAPCOM Negative.  
ARMSTRONG I didn't get it (garbled) but  
they are right in the vicinity of the LOM.  
CAPCOM Neil, this is Houston. I see  
you've got the core tubes and the solar wind. Anything  
else that you can throw into the box would be acceptable.  
ARMSTRONG Right-o.  
ARMSTRONG (garbled)  
ALDRIN I got the cap.  
ARMSTRONG Got the cap?  
ALDRIN They both have got caps on  
them.  
ARMSTRONG Okay.  
ALDRIN And, you want to pick up some  
stuff, and I'll - -  
ARMSTRONG (garbled)  
ALDRIN Put the solar wind.  
PAO That's Buzz Aldrin retrieving  
the solar wind experiment.

END OF TAPE

CAPCOM Buzz, this is Houston. It's about time for you to start your EVA close out activities.

ALDRIN Roger.

PAO They've been on their life support systems 2 hours and 25 minutes. Neil appears to be picking up rocks to the right of the screen.

CAPCOM Neil and Buzz, this is Houston. We'd like to remind you of the close up camera magazine before you start up the ladder.

ALDRIN Okay. Got that over with you, Neil?

ARMSTRONG No, the close up camera's underneath the MESA so I'll have to pick it up with the box. I'm picking up several pieces of really vesicular rock out here now.

ALDRIN You didn't get anything in those environmental samples, did you?

ARMSTRONG Not yet.

ALDRIN I don't think we'll have time.

CAPCOM Roger, Neil and Buzz. Lets press on with getting the close up camera magazine and closing out of the sample return container. We're running a little low on time.

ALDRIN Roger.

PAO We want to keep a good margin in those portable life support systems.

ALDRIN Okay, can you quickly stick this in my pocket Neil and I'll get on up the ladder. I'll hold it and you open the packet up.

ARMSTRONG (Garble) let the pocket go. (Garble.)

ALDRIN Get it.

ARMSTRONG Okay.

ALDRIN Adios amigo.

ARMSTRONG Okay.

ALDRIN Anything more before I head on up, Bruce?

CAPCOM Negative. Head on up the ladder, Buzz.

PAO That white dot, right above the horizon on the right is a phosphorus spot from the TV converter.

END OF TAPE

PAO spot from the TV converter in the park station in Australia.

ALDRIN How are you coming Neil?

ARMSTRONG Okay.

ARMSTRONG Did you get that (garbled).

ALDRIN Right. That's it right there.

ARMSTRONG Okay.

ALDRIN Do you think you can reach the -  
(garbled) hanging over here. You might entertain the idea of sensing up the second one that way.

ARMSTRONG Okay.

ALDRIN Did you get the film off of that?

ARMSTRONG Yes.

ALDRIN Okay, I'm heading on in.

ARMSTRONG Okay.

ALDRIN And I put the LEC already in the box.

PAO Neil's been on the surface a few minutes longer than two hours. Buzz, approximately 20 minutes less than that.

CAPCOM Neil, this is Houston. Did the Hasselblad magazine go off on that sample return container. Over?

ARMSTRONG I've got the Hasselblad magazine hooked to the SRSC now.

CAPCOM Roger.

ARMSTRONG How are you doing, Buzz?

ALDRIN I'm okay.

ALDRIN Reading to be sending up the LEC?

ARMSTRONG Just about.

END OF TAPE

ALDRIN Okay. That's got it clear.  
PAO Transferring the sample containers  
into the LM cabin now.  
ARMSTRONG Oh. (garble) came off, I mean the  
(garble) came off.  
ALDRIN All right. Just ease it down now.  
Don't pull so hard on it. All right. Let it go.  
ARMSTRONG While your getting that, I've got  
to get the camera  
ALDRIN (garble)  
ARMSTRONG No problem. Okay. Stand by a second.  
CAPCOM Neil. This is Houston. Request an  
EMU check. Over.  
ARMSTRONG Roger. Got 3.8. And I got 54 on the  
O2 and no flags. And my flow is in N.  
PAO The Lick Observatory in California  
reports a return on that lazer experiment.  
CAPCOM Neil and Buz, for your information  
your consumables remain in good shape. Out.  
ALDRIN Roger.  
ALDRIN How's it going, Neil?  
ARMSTRONG Okay. I've got one side hooked up  
to the second box and I've got (garbled)-  
ALDRIN Okay. Good.  
ARMSTRONG I've got bilge from on the LEC. It's  
kind of falling all over me, while I'm doing this.  
ALDRIN Kind of like soot, huh?  
ARMSTRONG It looks like down here.  
ALDRIN I think my watch stopped now.  
ALDRIN No. It didn't either. Second hand.  
ALDRIN Okay. If you can just hold it now,  
I think I can do the pulling.  
ARMSTRONG Okay. Stand by a minute, Let me  
move back.

END OF TAPE

ALDRIN Okay, easy. All right, easy in the hatch now.

ARMSTRONG Okay. I got it the rest of the way. And I'll give it to you to (Garble) away. Just a second. Never mind.

PAO Two hours and 40 minutes on the PLSS's.

ARMSTRONG Buzz.

ALDRIN Okay. Turn up.

ARMSTRONG How about that package out of your brief. Get that?

ALDRIN No. Now I'll get it. Get up there. Better now?

ARMSTRONG Let go. Okay?

ALDRIN Okay.

CAPCOM Neil, this is Houston. Did you get the Hasselblad magazine.

ARMSTRONG Yes, I did. And we got about, I'd say, twenty pounds of carefully selected, if not documented, samples.

CAPCOM Houston. Roger. Well done. Out.

PAO Unofficial time off the surface at 111:37:32.

ALDRIN Okay, now start arching your back. That's good. Plenty of room. Now arch your back and move your head up against (cut out). Roll right just a little bit. Head down. And in good shape.

ARMSTRONG Thank you. I'm open now?

ALDRIN Now you're clear. You're rubbing up against me a little bit.

ARMSTRONG Okay?

ALDRIN Right. That's right.(Garble). Okay. Now move your foot, and I'll get the hatch.

ARMSTRONG Okay.

ALDRIN Okay, the hatch is closed and latched. And we're up by it secure.

ARMSTRONG Okay. Now we burn the feed-water valve. And I got your PLSS antenna stuck.

ALDRIN Okay. Feed-water valve closed, and the antenna's stuck.

ARMSTRONG Okay.

ALDRIN Somebody broke the hinges.

ARMSTRONG That's out. (Garble) but I did my part of it. Okay. (Garble.)

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 24:11 GET 111:39 365/1

CAPCOM This is Houston. Go ahead.  
CAPCOM You're cutting out Neil. You're not  
readable. I understand you said something about contingency  
sample container on the ascent engine?  
CAPCOM We are not reading you Neil. Buzz,  
Buzz, this is Houston. Do you read? Over.  
CAPCOM Tranquility Base, this is Houston.  
We are reading neither one of you but standing by.  
PAO Cabin pressure coming up about  
2.789 pounds. Up to 3 now. 4 psi.  
PAO We assure the cabin at 4.8 now.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 111:44, CDT 24:16 366/1

PAO The LM's systems look good. Crewmen  
should now be transferring back to Tranquillity Bases  
environmental control system and later we'll switch to  
the vehicles communications system. We estimate it will  
be another 10 to 15 minutes before their on the LM communication  
system.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 24:21 GET 111:49 367/1

PAO And the replica of the American flag  
on the lunar surface is now being erected here in the Control  
Center. And a replica of the plaque on the Tranquility Base  
has been hung on the wall.  
CAPCOM Neil, this is Houston. Neil, this is  
Houston. Radio check. Over.  
CAPCOM Buzz, Buzz, this is Houston. Radio  
check, radio check. Over.  
CAPCOM This is Houston. A copy of transmission  
calling Houston. All LOS's broken up. Over.  
CAPCOM Neil, this is Houston. If you read,  
we suggest you install one course antenna so we can have  
communications. Over.  
ARMSTRONG I receive.  
CAPCOM Neil, this is Houston. We seem to be  
reading you now. How do you read us? Over.  
ARMSTRONG (Garbled)

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 DET 24:27 GET 111:55 368/1

TRANQUILITY Houston, this is Tranquility. How do  
you read?  
CAPCOM Tranquility Base, this is Houston. Loud  
and clear. How us?  
TRANQUILITY Loud and clear. We're in the process  
of switching over to LM Comm.  
CAPCOM Roger.  
CAPCOM Tranquility Base, this is Houston. We'd  
like to verify your steerable antenna and track mode 2.  
We're going to do a communications handover here on Earth.  
Over.  
TRANQUILITY Roger. That's affirmative. We're in  
track mode 2.  
CAPCOM Roger, out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 112:00, CDT 24:32 369/1

CAPCOM Columbia, Columbia, this is Houston. Over.  
COLUMBIA Roger, Columbia to Charlie. How do you  
read?  
CAPCOM Roger, Columbia. This is Houston. We're  
reading you loud and clear on OMNI Charlie. The crew of  
Tranquillity Base is back inside their base, repressurized  
and they're in the process of dopping the PLSS's. Everything  
went beautifully. Over.  
COLUMBIA Hallelujah.  
CAPCOM And we'd like to get POO and accept from  
you -

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/20/69 CDT 24:37 GET 112:06 370/1

ALDRIN Hallelujah.  
CAPCOM And, we'd like to get a P00 and accept from you. We have a state rector up light. And, after that, we'd like you to realign your platform to the new F marker we sent up a rev or two ago. Over.

ARMSTRONG Alright. Understand. You want a option 1, 82 option 1.

PAO This is Apollo Control. Dr. Charles Berry reports that heartrates during this EVA period ranged from a low of 90 for both crewmen to a high of about 125 for Buzz Aldrin at 2 periods. And, a high of 160 for Neil Armstrong at 3 periods. That top reading coming during the time he was transferring the rock boxes into the LM. Dr. Berry says the data they got indicates Neil Armstrong was working very hard at that time.

CAPCOM Columbia, this is Houston. We're going to up with your (garbled) and then we'll send rest up again because sending the state vector up will wipe out the one that you have onboard and then you can do a P52 or option 1. Over.

COLUMBIA This is true.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 24:43 GET 112:12 371/1

CAPCOM Columbia, this is Houston. Do you read? Over.

COLUMBIA Roger Houston. I read you.

CAPCOM Okay, Columbia. We've completed the uplink. The computer is yours. You can go block; however, we would like for you to hold off on the P52 option on the line until after you have passed landing site 2 and we requested that you perform another P22 and attempt to find the LM's path. I've got the numbers for you when you are ready to copy. Over.

COLUMBIA (garbled)

COLUMBIA Ready to copy.

CAPCOM Roger, Columbia. P22 landmark ID is lunar module - make that Tranquility Base; P1:112:25:08; P2 112:30:17 four nautical miles south; final closest approach 112:31:52; shaft 357 decimal 051; trunnion 047 decimal 432; roll zero; pitch 250; yaw zero. Readback over.

CAPCOM Columbia, this is Houston. Did you copy my P22 update? Over.

END OF TAPE

COLUMBIA Houston, Columbia.  
CAPCOM Columbia, this is Houston. Did you copy my P22 pass? Columbia, this is Houston. Do you copy my pad, over?  
COLUMBIA Negative Bruce. Just give me the latitude and longitude over 2, altitude and the grid square never mind the other you're broken up.  
CAPCOM Stand by.  
COLUMBIA (Garbled) new information otherwise I'll just use the old numbers.  
CAPCOM No, wait a minute we've got new information.  
COLUMBIA Okay.  
PAO This is Apollo Control at 112 hours, 19 minutes. The inhabitants of Tranquillity Base are still in the post EVA clean up period. Still have not fully configured the voice communications, however, we are getting telemetry - good telemetry from Tranquillity Base showing a cabin pressure of 5 pounds per square inch, temperature of 60 degrees. We expect to establish communications before too long. During this period the crew is removing the portable life support systems, checking over their spacecrafts systems, getting ready for jettisoning equipment from Tranquillity Base. The cabin will be depressurized before too long and equipment will be jettisoned onto the lunar surface.  
CAPCOM Tranquillity Base, this is Houston. Can you give us some idea of how you're progressing on the PLSS dosing and preparation for depress?  
TRANQUILLITY Roger, Houston. Tranquillity Base. We're in the process of using up what film we have and I'm just getting ready to change the primary ECS canister. Over.  
CAPCOM Roger, Tranquillity. We'd like to hold off as long as possible on the philipium hydroxide canister make that one of the last things you do in getting ready for the depress if you can. Over.  
TRANQUILLITY Roger. We're planning on doing that. I was just wondering how much longer we want to wait though. We've probably got another half an hours worth of picture taking and I guess we could run through an eat cycle and that changed canister in S depress. Over.  
CAPCOM Roger. That sounds fine to us.  
TRANQUILLITY Well it will be a little crowded in here for a while.  
CAPCOM We don't mind a bit.  
COLUMBIA Houston, Columbia. You got the new coordinates?  
CAPCOM Columbia, this is Houston. -

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 24:48 GET 112:22 373/1

CAPCOM Columbia. This is Houston. Go ahead.

COLUMBIA Roger. Have you got the new coordinates for me?

CAPCOM Roger. Latitude 00.691, that would be plus 00.691 and Longitude over 2 is plus 11.713. The altitude is minus 1.44 nautical miles. Over.

COLUMBIA Roger.

CAPCOM Columbia. This is Houston. On latitude, make that plus 00.692, rounding off. Over.

COLUMBIA Okay. Read back plus 00.692 plus 11713 and minus 00144. Can you have a grid square for me?

CAPCOM Roger. Stand by.

CAPCOM Columbia. This is Houston. Grid coordinance kilo decimal 9, 6 decimal 3, on LAM 2. Over.

COLUMBIA 0.9 and 6.3. Thank you.

One of these grid squares is as much as you can stand on a single pass.

CAPCOM Roger.

CAPCOM And for your information, Columbia, you're approaching the VHF line of site, comm limit with tranquility base. LOS will be at 38 minutes plus 25 seconds. Over.

COLUMBIA Roger.

CAPCOM Roger. We've had to disable the one way miss in relay owing to a ground site reconfiguration down here. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 24:53 GET 112:27 374/1

DEAD AIR

END OF TAPE

COLUMBIA Houston, Columbia. (Garble.)  
CAPCOM This is Houston. Go ahead. Over.  
COLUMBIA Roger. I can't see them.  
CAPCOM Roger. I guess that takes care of the  
news for today, Mike.  
COLUMBIA Roger.  
CAPCOM You might be interested in knowing, Mike,  
we have gotten reflections back from the laser reflector ray  
they deployed, and we may be able to get some information out  
of that a little later.  
COLUMBIA Right. I need a very precise division,  
because I can only do a decent job of scanning maybe one of  
those grid squares at a time. We've been sweeping covers -  
10's and 20's and 30's of them.  
CAPCOM Roger. We understand this is intended  
to be your last C-22. We don't want to use up too much fuel in  
this effort. Over.  
COLUMBIA Roger. The fuel (garble).  
CAPCOM Roger. There's no problem fuel-wise.  
It's just that there seems to be a limit to the number of  
C-22's and the number of grid squares we can search over. Over.  
COLUMBIA Roger. Well, I'll continue this maneuver,  
then to roll 82, pitch 218, yaw zero, if that's okay with you.  
And do a P-52 in that attitude. And that'll be a (garble).  
CAPCOM Roger. That's fine with us. A P-52 in  
that attitude. Roger, a P-52 and then the sleep attitude.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 112:36 CDT 1:03 376/1

CAPCOM                   Tranquility base, this is  
Houston. Over.  
TRANQUILITY               Houston, Tranquility base. Go  
ahead.  
CAPCOM                    When you all have a free  
moment, I have your P8 through P12 flight data. Over.  
TRANQUILITY               Roger. Stand by.  
TRANQUILITY               Houston, Tranquility base.  
Ready to copy.  
CAPCOM                    Roger, Tranquility. P8, 114,  
30, 57. P9, 116, 29, 10. P10, 118, 27, 23. P11, 120, 25,  
36. P12, 122, 23, 49. Read back. Over.  
TRANQUILITY               Roger. P8, 114, 30, 57. P9,  
116, 29, 10. P10, 118, 27, 23. P11, 120, 25, 36. P12,  
122, 23, 49. Over.  
CAPCOM                    Readback correct. Houston out.  
COLUMBIA                  Houston. Columbia  
TRANQUILITY               Houston, Tranquility base.  
CAPCOM                    Columbia. Columbia. This is  
Houston. Over.  
COLUMBIA                  Coming into high gain.  
CAPCOM                    Roger. Reading you loud and  
clear on the high gain, Columbia.  
COLUMBIA                  Roger. Going into P52 attitude,  
(garbled)  
CAPCOM                    Say again, Columbia.

END OF TAPE

ALDRIN I say again, I am maneuvering to the  
P52 attitude and do you want a crew status report?  
CAPCOM Roger and go ahead with your crew  
status report.

ALDRIN Roger. No medication radiation 100.16.  
CAPCOM Houston, we copy.  
ALDRIN Houston, Tranquility Base.  
CAPCOM Go ahead Tranquility.  
ALDRIN Roger. The weight of the RCU was  
12 ounces by itself without the bag and the weight of the  
water from the CDR's PLSS was 12 1/2 ounces. That's reading  
zero with the bag on.

CAPCOM This is Houston. We copy. And for  
your information the new LM weight after jettison of equipment  
including lithium hydroxide canister is 10837. Over.

ALDRIN Okay. 10837.  
COLUMBIA Houston, Columbia. Did you copy the P52.  
CAPCOM Columbia, this is Houston. Affirmative.  
COLUMBIA Okay.  
CAPCOM Tranquility Base, this is Houston. In  
the flight plan configuration, we show that the stability  
control circuit breaker ACCA on Channel 16 should be open at  
this time. Over.

ALDRIN Houston, Tranquility. Say again which  
one should be closed.

CAPCOM Roger. Panel 16 row 2 stab control  
ACCA that is A-C-C-A. It should be open at this time. Over.

ALDRIN Roger. Coming open..

CAPCOM Roger. Out.

ALDRIN Houston, Tranquility. Do you have a  
way of showing a configuration of the engine arm circuit  
breaker? Over. The reason I am asking is because the end  
of it appears to be broken off. I think we can push it  
back in again. I'm not sure we could pull it out if we  
pushed it in though. Over.

CAPCOM Roger, we copy. Standby please.

CAPCOM Tranquility Base, this is Houston.  
Our telemetry shows the engine arm circuit breaker in the  
open position at the present time. We want you to leave it  
open until it is normally scheduled to be pushed in, which is  
later on. Over.

ALDRIN Roger. Copy.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 112:58, CDT 1:31 378/1

TRANQUILITY Houston, Tranquility Base. The CDR's  
TDR reads 11014.  
CAPCOM Roger. 11014 for the CDR.  
TRANQUILITY Roger. LMP reads 09018. Over.  
CAPCOM Roger. 09018.  
PAO' This is Apollo Control. Dr. Berry re-  
ports those dosimeter readings have not changed since yes-  
terday afternoon indicating that the crew was not subjected  
to radiation on the surface of the moon or if any a very  
negligable amount.  
COLUMBIA Houston, Columbia. Over.  
CAPCOM Columbia, this is Houston. Go ahead.  
COLUMBIA Roger, Bruce. When you get a few min-  
utes could you give me some words on tomorrows activities  
when they're going to start?  
CAPCOM Roger.

END OF TAPE

CAPCOM Columbia. Columbia. This is Houston.  
Over.

CAPCOM Columbia. This is Houston. Over.

COLUMBIA Go ahead.

CAPCOM Roger, Mike. Couple of quick flight  
plan updates, here. First off, we'd like to get an O2 fuel  
cell purge at time 113:30. Are you copying. Over.

COLUMBIA Roger. Copy.

CAPCOM Secondly, we will return to the  
nominal time life with your scheduled wake up of 121 hours  
and 12 minutes. We sort of slipped by the lithium hydroxide  
canister change number 9 during the EVA and EVA prep, and  
we'd like you to accomplish that now. The comm per sleep  
will be the normal lunar comm configuration. The RCS  
configuration, we're requesting that you use quad alpha and  
Bravo. A data load for R2 should be 01111. Read back. Over.

COLUMBIA Roger. Oxygen in fuel cell purge  
at 113:30. Return to the nominal time line at 121 hours  
wake up lithium hydroxide change number 9 right now. Normal  
lunar comm sleep configuration, I'm in that now. On the RCS  
I understood before that you wanted to move the dap register  
to 011000 which made sense on (garble) to pitch only on  
quad A enable all in quad B to C and D off, but you don't  
want to do that any more, huh?

CAPCOM Columbia. This is Houston. On your  
dap load in R2, we were requesting a 01111. Over.

COLUMBIA Okay. ... going in right now.

CAPCOM Roger. And you'll be enabling quads  
alpha and bravo on the LORCS select, so you'll disable  
Charlie and Delta.

CAPCOM And we have a little less than  
2 minutes to LOS. If you're still up, LOS next time around  
will be 11404. Over.

COLUMBIA Roger

CAPCOM And Columbia, if it's agreeable with  
you, we'd like for you to stay awake until we have one success-  
ful acquisition on the high gain antenna, and I guess you  
can plan on turning in shortly after LOS in this next pass.  
Over.

COLUMBIA Copy.

CAPCOM Roger. Out.

CAPCOM Tranquility, base. Tranquility, Base.  
This is Houston. Radio check. Over.

TRANQUILITY Go ahead. Houston.

CAPCOM Reading you loud and clear. Just want-  
ed to make sure we had comm.

TRANQUILITY We're just finishing up our eat  
period. Be ready to go back into prep for press.

PAO This is Apollo Control- -

END OF TAPE



PAO - hours one minute. We have about  
2 minutes worth of tape. We'll play that for you now.  
CAPCOM (Garble.) This is Houston. Over.  
EAGLE Roger. Go ahead, Houston.  
CAPCOM Roger. On your next depressurization,  
it's acceptable to use the overhead hatch dump valve in addition  
to, or instead of the forward hatch dump valve to speed up the  
depressurization of the cabin. I have a P-13 update for you,  
and if you could sometime there give us PU and data, we'll  
uplink you a new CSM space vector. Over.  
EAGLE You've got the DSKY.  
CAPCOM Roger. Your P-13 time is 124:22:02.  
Over.  
EAGLE Roger. It's P-13 124:22: - is that  
02? Over.  
CAPCOM That's affirmative. That is 02, and  
do you have a time estimate for us until you're ready to start  
cabin depress. Over.  
EAGLE 15 minutes maybe?  
CAPCOM Roger. Tranquility Base, this is Houston.  
Uplink complete. The computer's yours, and you can go out of  
data.  
EAGLE Roger.  
TRANQUILITY Go ahead. Tranquility Base here.  
CAPCOM Roger. I guess you guys know that since  
you're an hour and a half over the time line, and we're all  
taking a day off tomorrow, we're going to leave you. See you  
later.  
TRANQUILITY I don't blame you a bit.  
CAPCOM That's a real great (garble). I really  
enjoyed it.  
TRANQUILITY Thank you. You couldn't have enjoyed  
it as much as we did.  
CAPCOM Roger. It sure was great. Sure wish  
you'd hurry up and get that trash out of there, though.  
TRANQUILITY Well, we're just about to do it.  
CAPCOM Okay.  
PAO We're live now. The CAPCOM voice on  
that last transmission was Deke Slayton, the director of Flight  
Crew Operations here at MSC.  
CAPCOM Tranquility Base, this is Houston. We  
showed a suit release valve still on the AUTO position. It  
should be closed. Over.  
CAPCOM Columbia, this is Houston. Over.  
COLUMBIA Houston, Columbia. Go ahead.  
CAPCOM Roger. We've successfully reacquired  
high gain antenna. Unless you have some other traffic with us,  
I guess we'll bid you a good night and let you get some sleep,  
Mike. Over.

COLUMBIA Okay. Sounds fine.  
CAPCOM And we're going to power down the voice subcarrier part of our uplink to you, in order that we don't disturb you while we're talking to Tranquility Base. If you need us, just give us a call and we can respond with a time lag of about a minute to a minute and a half and get it reconfigured. Over.

COLUMBIA Okay.

CAPCOM Roger and good night.

COLUMBIA Okay and thanks a lot.

PAO We said good night to Mike Collins and Columbia at 114 hours 6 minutes. And the cabin is coming down now on Tranquility Base. And it's down to about three and a half pounds now and holding that.

CAPCOM Columbia, this is Houston. We'd like you to Enable the thrusters for BRAVO 1 and BRAVO 2. AUTO RCS Select. Over.

COLUMBIA BRAVO 1 and BRAVO 2 Enable.

CAPCOM Roger. Out.

PAO The Tranquility Base pressure coming on down now, one and a half pounds.

CAPCOM Tranquility, this is Houston. For a reference, which Dump valve are you using. Over.

TRANQUILITY We read the following dump valve until about 2 psi, and we're using the overhead now.

CAPCOM Roger. Out.

TRANQUILITY (Garble), they're both open now.

PAO Less than half a pound of pressure now.

END OF TAPE

PAO Unofficial time for start of this second depressurization 114 hours, 8 minutes, 12 seconds. Suit pressure is holding at about 3.9 pounds per square inch. The cabin pressure down to about a tenth of a pound now. .04 pounds now. There went something. Looked like a portable life support system. Here comes the other PLSS. Cabin is being repressurized now. The experiments console reports the seismometer recorded both the impacts of those portable life support systems. Cabin pressure up over 1 psi. Up to 2 now. 3 pounds per square inch. 4 pounds. Leveling off to about 4.8.

TRANQUILITY Houston, Tranquility Base. Repress complete.

CAPCOM Roger, Tranquility. We observe your equipment jetison on TV and the passive seismic experiment reported shocks when each PLSS hit the surface. Over.

TRANQUILITY You can't get away with anything anymore can you.

CAPCOM No indeed.

PAO Items scheduled to be jetisoned were the two portable life support systems, the lithium hydroxide canister, and the arm rests from the LM. We expect the crew to turn off the TV very shortly switching over to the -

END OF TAPE

PAO Switching over to another telemetry mode when they turn off the TV switch.

CAPCOM Tranquility Base, this is Houston. Over.

ALDRIN Go ahead Houston.

CAPCOM Roger. When you get back into your surface checklist and come over to a comm lead configuration on base surface 45. We would like you to enable the ranging feature on your S-Band; that is when you come down to S-Band configuration instead of caution warning electronics enable TV, we would like for you to go into the range position and leave it there for as long as you conveniently can till you get ready to commence your rest period and we'll try to get a little more ranging data on you. Over.

ALDRIN Roger, copy.

CAPCOM And of course when you get ready to turn in, go back into caution warning enable and we would like to say from all of us down here in Houston and really from all of us in all the countries and in the entire world, we think that you have done a magnificent job up there today. Over.

ALDRIN Thank you very much. It has been a long day.

CAPCOM Yes, indeed. Get some rest there and have at it tomorrow.

ALDRIN Houston, Tranquility. Did you all come up with any other solution that we might try to the mission timer problem? Over.

CAPCOM Standby Tranquility. We'll be back with you in just a minute.

ALDRIN Houston, Tranquility. Have you had enough TV for today?

CAPCOM Tranquility this is Houston. Yes, indeed; a mighty fine presentation.

ALDRIN Okay, signing off. See you tomorrow.

CAPCOM Roger.

PAO And the TV went off at 114 hours 25 minutes 47 seconds.

CAPCOM Columbia, Columbia this is Houston. Over.

COLUMBIA Go ahead Houston.

CAPCOM I'm sorry to bother you Columbia. Two things. We request that you select 10 degree dead band in your dap in accordance with the procedures on foxtrot 9-7 in your checklist and secondly we would like to lead a display on the DSKY that is not one that is cycling being continuously updated. What you would have when you get through winding the dead band would be a static display and that will be satisfactory. Over.

COLUMBIA Okay.

CAPCOM Roger. Goodnight again.

CAPCOM Tranquility Base, this is Houston. Over.

ALDRIN Roger, go ahead.

CAPCOM Roger, on your mission timer we wanted to pull a circuit breaker and let it cool down for an hour and a half to two hours. I believe the breaker is currently open. It has been off so go ahead and reset the mission timer circuit breaker. Put the timer control to reset and hold it in reset for 30 seconds and then slue it to your desired setting left to right and voice the timer control to start. Over.

ALDRIN Okay, we'll try it.

CAPCOM Houston, our mission timer seems to be slueing okay. You want to give us a time hack?

ALDRIN Can we get it off the CMP - LGC I mean?

CAPCOM Roger Tranquility. I'll give you a time hack at 114:31:00. It's about 30 seconds from now. Over. Standby for a mark at 114:31. Standby. Mark.

END OF TAPE

CAPCOM Tranquility, this is Houston.  
Did you copy by mark at 114:31?

TRANQUILITY Roger. Thank you, and our  
mission timer is ready now.

CAPCOM Roger. Very good. And, I've  
got a consumables update for you if you are ready to copy.  
Over.

TRANQUILITY Okay. Go ahead.

CAPCOM Okay. RCS alpha is 81 percent,  
RCS bravo 75 percent. Coming up on 115.0 is GET. Descent  
oxygen is 31.8 pounds or 59 percent. Descent amp hours  
858, and ascent amp hours 574. Over.

TRANQUILITY Roger. Copy. Thank you very  
much.

CAPCOM Roger. Out.

CAPCOM Tranquility, this is Houston.  
We also have a set of about 10 questions relating to  
observations you made, things you may have seen during the  
EVA. We can either discuss a little later on this evening  
or sometime later in the mission. It's your option. How  
do you feel? Over.

TRANQUILITY I guess we can pick them up  
now.

CAPCOM Okay, and your friendly green  
team here is pretty well been relieved by your friendly maroon  
team, and I'll put Ward on with the questions.

TRANQUILITY Okay. Thank you, Bruce.

CAPCOM Tranquility, Houston. First  
question here is your best estimate of the yaw on the - of  
the LM as compared to the nominal of crew flight plan. Over.

TRANQUILITY We got 13 degrees left on the  
ball, and I think that's probably about right. Looking at  
the shadow, we probably have about 13 degrees left of the  
shadow.

CAPCOM Roger, that's 13 degrees left  
of the shadow. And, next question relates to the depth of  
the bulk sampling that you obtained near the first part of  
the EVA, and any changes in composition that you might have  
observed during the bulk sampling interval. Over.

TRANQUILITY I'm not sure I understand that  
question, but we got a good bit of the ground mass in the  
bulk sample plus a sizeable number of selective rocks of  
different types.

CAPCOM Roger, Neil. One of the impli-  
cations here is the depth from which the bulk sample was  
selected. Did you manage to get down there several inches  
or nearer the surface? Over.

TRANQUILITY We got some down from as much  
as 3 inches in the area where I was looking at (garbled)

TRANQUILITY the variation with depth at ... with the bulk sample, that there really was an appreciable difference, and I didn't run into any hard bed. Later on, other types and other areas where I got just a short distance - an inch or two - and couldn't go any further.

CAPCOM Roger. Believe we understand down as deep as 3 inches, did not hit any hard bed, and no significant changes in composition to that depth. Next question, the second SRC was packed rather hurriedly due to the time limitations, and wonder if you would be able to divide any more detailed description of the samples which were included in the second SRC. Over.

TRANQUILITY We got 2 core tubes and a solar wind, and about half of a big sample bag full of assorted rocks which I picked hurriedly around the area. I tried to get as many representative types as I could.

CAPCOM Roger, Neil. Next topic here relates to the rays which luminate from the DPS engine burning area. We were wondering if the rays luminating from the - beneath the engine are any darker or lighter than the surrounding surface. Over.

TRANQUILITY The ones that I saw back in the back end of the spacecraft appeared to be a good bit darker, and of course, viewed from the aft end, well they did have the sun shining directly on them. It seemed as though the material had been baked somewhat and also scattered in a radially outward direction, but in that particular area, this feature didn't extend more than about 2, maybe 3 feet, from the skirt of the engine. Over.

CAPCOM Roger. Understand that near the aft end up to the eve, that the rays did appear to be darker. I understand, Buzz, that these were - this was the appearance of the material which had been uncovered by the rays that appeared darker for 2 or 3 feet extending out. Is that correct?

TRANQUILITY No, I wouldn't say it was necessarily material that had been uncovered. I think some of the material might have been baked or in some way covered to be more cohesive and perhaps go together or something - I don't know. Now, in other areas, before we started traveling around out front, why we could see that small erosion had taken place in a radially outward direction, but it had left no significant mark on the surface other than just having eroded it away. Now, it was different back in the - right under the skirt itself. It seems as though the surface had been baked in a streak fashion, and I think a couple of pictures on film will show that. But, that didn't extend very far. Over.

CAPCOM Roger, Tranquility. And, this

CAPCOM is great concern that you've described or at least suggested - your suggestion was that it was due to the heat of the engine at any rate. Next subject, did - -

TRANQUILITY I believe so.

CAPCOM Roger. Next subject, did either of the solar panels on the PSE touch the surface of the moon during deployment? Over.

TRANQUILITY I think that two corners did touch just when it was deployed but both of them did come out at the same time. It unfolded a little unevenly and of course the crane that it was on was a little bit - not quite as level as it was - as I would like to have it. I think that two corners did touch to about 1 inch, 3/4 to 1/2 an inch deep and maybe along the bottom, it might have been maybe 3 inches leaving a small triangular coating on two of the corners, and I think these are on the western ones. Over.

CAPCOM Roger. Understand the description and the next subject on the 2 core tubes which you collected, how did the driving force required to collect these two - -

END OF TAPE

CAPCOM - the two core tubes which you collected, how did the driving force required to collect these tubes compare? Was there any difference? Over.

TRANQUILITY Not significantly. I could get down to about the first 2 inches without much of a problem and then as I would pound it in about as hard as I could do it and the second one took 2 hands on the handle and I was putting pretty good dents in the top of the extension rod and it just wouldn't go much more than - I think the total depth might have been about 8 or 9 inches. But even there it didn't for some reason it didn't seem to want to stand up straight. In other words, I'd keep driving it in and it would dig some sort of a hole but it wouldn't - just penetrate in a way that it would support it and I'd keep it from falling over if that makes any sense at all. It didn't really to me. Over.

CAPCOM Roger, Buzz. I think I've got the picture. You indicate that little difference between the two samples and that in each case you got down about 2 inches without any problems and then had to continue hammering rather vigorously in order to continue driving it into a total depth of 8 or 9 inches and even at that point the rods did not want to stay vertical. That they'd tend to fall over on you even after pounding in that far. Is that correct?

TRANQUILITY Yeah, that's about it. It wasn't a rapid change in resistive force. And also I noticed when I took the bit off that the material was quite well packed, a good bit darker, and it - the way it adhered to the cord tube gave me the distinct impression of being moist. Over.

CAPCOM Roger. I understand the general impression of being moist as packed in the cord tube. Next question. We did copy your comments prior to the EVA of your general description of the area. We wonder if either of you would have anymore lengthy description or more detailed description of the general summary of the geology of the area. Over.

TRANQUILITY We'll postpone our answer to that one until tomorrow, okay.

CAPCOM Yes indeed. That will be fine. Just a couple more here and I think these may not be quite as lengthy as number 7 there. Can you estimate the stroke of the primary and secondary struts? Over.

TRANQUILITY Well, I could do it like this. About all the struts are about equally stroked and the height from the ground to the first step is about 3 feet or maybe 3 and 1/2 feet.

CAPCOM Roger. Understand, Neil. Next topic, just after landing you pointed out that there was a hill to the west along the plus Z axis from the left. Are there

CAPCOM large rocks in that direction that might block the solar ray during the sunset - as sunset approaches in your locality - are there any large rocks that might tend to obscure the ray. Over.

TRANQUILITY No, I don't believe so. I think that it's about as level as any other area is that we chose.

CAPCOM Roger.

TRANQUILITY There's nothing large anyway that's going to get in the way.

CAPCOM Roger. Copy. That's also the way it appears from the television I think and now the final question. You commented, Neil, that on your flight to the landing spot you had passed over a football field size crater containing rather large blocks of solid rock perhaps 10 to 15 feet in size. Can you estimate the distance to this football size crater from your present position? Over.

TRANQUILITY I thought we'd be close enough so that when we got outside we could see its rim back there but I couldn't. But I don't think that we're more than a half mile beyond it. That is a half mile west of it.

CAPCOM Roger, so you estimate your present position less than a half mile approximately west of this large crater. Over.

TRANQUILITY That's correct.

CAPCOM Okay, you all. That takes care of the questions from our geologists for tonight and unless you have something else that will be all from us for the evening. Over.

TRANQUILITY Okay, thank you.

PAO The CAPCOM there was astronaut Owen Garrett, one of the group of five scientists astronauts selected in 1965.

CAPCOM Tranquility Base, Houston. We've now collected all the ranging data that we can use and you can go back to caution and warning and able. Over.

TRANQUILITY Roger, will do.

END OF TAPE

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CAPCOM Tranquility Base. Houston. Over.

TRANQUILITY Go ahead, Houston.

CAPCOM Roger. A few more verifications, here.

Can you - will you verify that the disk with messages was placed on the surface as planned, and also that the items that are listed in the flight plan, all of those listed there were jettisoned. Over.

TRANQUILITY All that's verified.

CAPCOM Roger. Thank you and I hope this will be a final good night. Okay.

PAO Tranquility Base has confirmed that they left on the lunar surface all the items they had planned to. We have said good night to Neil Armstrong and Buzz Aldrin. We will continue to monitor throughout this rest period which is scheduled to end at about 122 hours elapsed time. We're not 114 hours 53 minutes. Should there be any further conversations with either Tranquility Base or Columbia, we will come back up and bring those to you. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 4:23 GET 115:50 388/1

PAO This is Apollo Control at 115 hours 50 minutes. It's been almost an hour since we said good night to Tranquility Base. Dr. Kenneth Biers, the flight surgeon on this shift, reports that he does not believe that Neil Armstrong is asleep yet. From his heartrate, he thinks he's resting and perhaps dozing from time to time, but he doesn't believe that he is asleep. Neil is the only one being monitored in Tranquility Base. There is no biomedical instrumentation for Buzz Aldrin. Dr. Biers reports that Mike Collins is sound asleep in Columbia as it orbits the moon. Columbia has just entered its 21st revolution of the moon. All systems on the Lunar Module are in good order, showing cabin pressure of 4.9 pounds per square inch, cabin temperature 62 degrees Fahrenheit. We have not heard from Tranquility Base since saying good night and we have not attempted to call them. This is Mission Control, Houston.

END OF TAPE





PAO This is Apollo Control 120 hours 59 minutes ground elapsed time. We've called the spacecraft Columbia from Mission Control here to wake up Mike Collins. The network is configured so that the LM crew, the Eagle crew, will not be disturbed. Lets join the conversation in progress.

CAPCOM Columbia, Columbia, good morning from Houston.

COLUMBIA Good morning.

CAPCOM Hey Mike, how's it going this morning?

COLUMBIA How goes it?

CAPCOM Real fine.

COLUMBIA (garbled) How's it going with you?

CAPCOM Real fine here. Columbia, request P00 in accept. We'll shove the state vector in for you right away.

CAPCOM Okay, it's coming up now, Columbia. We're going to keep you a little busy here. As soon as we get the state vector in we'd like you to go ahead and do a P52 option 3 on this night pass, and then when you come on around the other side there we'll give you some landmark tracking information on prime 130.

COLUMBIA Very good.

CAPCOM And for your information we're also going to have Tranquility Base do a P52 when you come around the other time, and I have the P22 information if you are ready to copy.

COLUMBIA Go ahead.

CAPCOM Okay, track landmark 135 using P22, and for information this will properly position your rendezvous radar transponder. T1 is 122 plus 16 plus 05 - okay, stand by.

CAPCOM Columbia, Houston. The computer is yours.

COLUMBIA Okay, and I'd like grid square of this crater 130 prime. Over.

CAPCOM Columbia, Houston. Say again about 130 prime.

CAPCOM Columbia, Houston.

COLUMBIA Go ahead.

CAPCOM Roger. I have a T1 and T2 times and also the longitude of the 130 prime. We're working on the grid squares and we'll get them shortly.

COLUMBIA Ready to copy.

CAPCOM Okay, T1: 122 plus 16 plus 05. Tango 2: 122 plus 21 plus 11 and 6 miles north of track. Do you want your NOUN 89 values?

COLUMBIA Yes, please.

CAPCOM Roger. Latitudes plus 01.243. Longitudes over 2, plus 11.844. Altitude minus 001.46. Over.

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COLUMBIA Copy T1: 122:16:05. T2: 112:21:11, 6 miles north, NOUN 89 is plus 01243 plus 11844 minus 00146.

CAPCOM Columbia, affirmative, and at the T1 time put your rendezvous radar transponder switch to OPERATE.

COLUMBIA All right.

CAPCOM And this 130 prime is the same one that you tracked prior to descent. Over.

COLUMBIA Okay. You've updated your information as to the LM's position and this is your best estimate of where the LM is. Is that correct?

CAPCOM Columbia, that's negative. This 130 is the little bitty crater there that you tracked - John Young's crater - that you tracked prior to descent. And we want that -

COLUMBIA Fine, okay. You've given up looking for the LM.

CAPCOM Affirmative. We want this for one last fix on your plane.

COLUMBIA All right, fine, Understand. Thank you.

CAPCOM And when the LM does his P22 on your transponder, well then that will be our last shot at the LM's position.

COLUMBIA Roger, understand. Do you care whether my transponder is on before T1?

CAPCOM Roger, it'll be on WARMUP prior to that time and you can go to OPERATE any where around that time.

COLUMBIA Yes, I get it, it's on its 24 minute warmup now.

CAPCOM Roger.

CAPCOM And Houston, the computer is yours, you can go to BLOCK any time.

COLUMBIA Roger, BLOCK going P52 option 3.

CAPCOM Roger, and we'll see you coming around the other side. About 1 minute to go and all your systems are looking good.

COLUMBIA Thank you.

END OF TAPE



PAO This is Apollo Control. Let's join the call to Tranquility Base.

CAPCOM How is the resting stand up there, or did you get a chance to curl up on the engine camp?

EAGLE Roger, Neil has rigged himself a really good hammock with a weight gutter, and he's been lying on the hatch and engine cover, and I curled up on the floor. Over.

CAPCOM Roger. Copy, Buzz. We've got a couple of changes to your surface check-list here, and in general, what we're going to want you to do is P-22 tracking the command module for one last hack on your position there. This will be - in other words, P-57, P-22, and then press on (garble) with the check list, and the rest of them are a couple of minor changes in the check list. The main one being that we do not want the rendezvous radar on during the ascent, and we expect that this will take care of some of the overflow of program alarms that we're getting during descent.

EAGLE Okay, we had the rendezvous radar in slew during descent though.

CAPCOM Traquility Base, Houston. I missed that. Say again.

EAGLE Roger, I say again. We had the rendezvous radar switch in the P00 position, not the LCG position.

CAPCOM Roger, we copy that. But there's a greater duty cycle on - there's a good 15 percent duty cycle on the ascent program there, so just go ahead and leave it off. And I have the changes if you want to get out your surface check list and I can go ahead and start giving them to you.

EAGLE Alright, go ahead. I've got it out.

CAPCOM Okay, before we start here, request P00 and data and we'll give you some vectors.

EAGLE You've got P00 and data.

CAPCOM Okay, and on surface 50 will be the first change there.

EAGLE Okay, and I understand you want us to do a P-57 option 3 and then a P-22. Is that the general idea? Over.

CAPCOM That's affirmative, so on the surface 50 there, down at the bottom of the page, just after pro after 2 recycles, stick in a time of 1:22 plus 15, do P-22 as per ping 20 of G and N dictionary. Over.

EAGLE Roger, understand that's 1:22 15 to P-22 as per pings 20 G and N dictionary.

CAPCOM Roger. Okay let's skip on over to surface 59.

EAGLE Okay.

CAPCOM Okay, this is going to be for one last vent on the DPS tank, so at the top of the page just after

CAPCOM EPS inverter 1 close, add - okay after  
EPS inverter 1 closed, add prop, descent helium red flash  
vent close, and then after stabilization control, AELD close,  
add prop displays flash engine override flash logic close. Over.

EAGLE Roger, copy. These are 2 circuit breakers,  
right?

CAPCOM Tranquility Base, affirmative. Those  
are just the circuit breakers at that time.

CAPCOM Tranquility Base, Houston. Did you  
get those 2 on the proportion circuit breakers?

EAGLE Roger, I have those 2.

CAPCOM Okay, let's go over to surface 60,  
and then down the middle of the page, after launch guidance  
system recommendation from MSFN, then add the switches -

EAGLE Roger, go ahead then.

CAPCOM Okay. After launch guidance system  
recommendation from MSFN add descent propulsion fuel vent  
open add descent propulsion oxidizer vent open add verify  
talkback gray. Over.

EAGLE Roger. Descent propellant fuel vent  
open, descent propellant oxidizer vent open verify talkback  
gray.

CAPCOM Roger, you've got that one, so that'll  
be the last vent and it will continue venting. Skip over to  
surface 61 down there at T minus 17.

EAGLE Roger, I'm there. Go ahead.

CAPCOM Okay, at t minus 17, delete CB 11,  
AC Bus A, rendezvous radar closed wait 30 seconds, delete  
PGNCS rendezvous radar close, and then add updated link switch  
to voice backup. Over.

EAGLE Roger, I have that. Leave those  
2 circuit breakers open, and have the updated link to voice  
backup, and we'll make the appropriate changes on the following  
circuit breaker status cards.

CAPCOM Roger, and you might add a little note  
down there at the bottom of the page - NOTE: - this is the  
bottom of page 61 - NOTE: Do not use tapemeter in PGNCS, i.e.,  
do not place mode select switch to ping. Over.

EAGLE Okay. We'll put it in AGS.

CAPCOM Roger, that's fair enough. That's  
some more of that computer load business.

END OF TAPE

CAPCOM                    Okay, that's all the changes we have the checklist here, I've got some - just the general notes, I'll read to you on P22, and just for some information, over.

EAGLE                    Okay, and then it looks to me like we ought to get hopping on this P57.

CAPCOM                    Roger, we agree wholeheartedly. And while your starting on that, I'll read, just read these notes on P22. Call P22 possible program alarm 5.6, range greater than 400 nautical miles, and then use the P22 as describing on things 20. Take option 1 in NOUN 06, and use the no update mode. Rendezvous radar will lock on at about 25 degrees elevation above the horizon. If 503 alarm occurs, designate bail. Key A proceed and allow the rendezvous radar to search for the CSM. And place the Range Altitude Monitor Switch in altitude, altitude rate to prevent the tape meter from driving into the stops. And press on.

EAGLE                    Roger, I think I have that.

PAO                      This is Apollo Control. A little over 2 minutes until Columbia comes over the hill again on the 24th Lunar Revolution. In that wake up call to Eagle, the crew described how they slept in the spacecraft by lying on the floor and on the engine cover. Some of the preliminary times being generated now ascent show ignition about 1 minute 26 seconds earlier than the premission flight plan. Ignition time now showing 124 hours 22 minutes 0 seconds. Burn will have a magnitude of 6,068 feet per second. Quite a bit of that will be in vertical rise and actually starting from zero feet per second on the lunar surface. The CSI maneuver behind the moon, the Concentric Sequence Initiate, CSI the acronym being for that maneuver., 125 hours 19 minutes 34 seconds. Consistent Delta height CDH 126 hours 18 minutes 0 seconds. Terminal Phase initiation 126 hours 57 minutes 0 seconds, and Terminal Phase Finalization or the final breaking before docking 127 hours 39 minutes 39.2 seconds. These are Ground computations. And they will be computed by the crew from radar tracking, rendezvous radar. So actually these number computed on the Ground are somewhat academic in that they will be computed in real time by the crew. We're standing by here for CAPCOM to resume conversation. During this up coming pass here, more definite fix on the Eagle positions will be attempted by using the rendezvous radar from the Eagle in Program 22, rendezvous radar lunar surface navigation program. The transponder on Columbia in the meantime has been warmed up. During the last revolution, Mike Collins was advised to - have the - the transponder warmed up. As of now, the exact location is somewhat vague. And perhaps this rendezvous radar exercise will give a final, more pinpoint location of where Eagle does indeed nest on the moon. We'll continue to monitor the air-ground circuit. We've had acquisition of signal with Columbia, so likely the conversation will increase here as we get the

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lock on, hopefully, with rendezvous radar as Columbia passes  
over the Eagle landing site. Still live on air-ground.  
CAPCOM Columbia, Columbia, Houston, over.  
CAPCOM Columbia, Columbia, Houston, over.  
COLUMBIA Houston, Columbia.  
CAPCOM Roger, Columbia. We'd like a cryo  
stir in all 4 tanks, and the standard 1 minute, over.  
COLUMBIA In works.  
CAPCOM Roger, and do you have any torquing  
angles from the P52?  
COLUMBIA Roger, stand by, over.  
CAPCOM Tranquility, Houston, request error  
reset at this time, over.  
EAGLE Roger, error reset, and would you tell me  
when you're satisfied with the LGC self test.  
CAPCOM Tranquility, LGC is a go.  
EAGLE Roger.  
COLUMBIA Torquing angles when you're ready.  
CAPCOM Columbia, Houston, go ahead.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69 CDT 10:33 GET 122:00 397/1

CAPCOM Columbia, Houston. Go ahead.  
COLUMBIA Under stars 25 and 42 manual  
difference 5 balls 993 plus 00165 plus 00186 minus 00039  
time of torquing 121 15. Over.  
CAPCOM Columbia, Houston. We copy.  
Thank you.  
COLUMBIA (Garble) completed.  
CAPCOM Roger. Thank you.  
TRANQUILITY Houston, this is Tranquility.  
Would you like a recycle on the VERB 6 and so forth? Over.  
CAPCOM Tranquility, Houston. We copy.  
Stand by 1.  
CAPCOM Tranquility, Houston. Request  
recycle.  
COLUMBIA (Garble)  
CAPCOM Spacecraft calling Houston?  
Say again.  
COLUMBIA (Garble)  
CAPCOM Roger, copy, Columbia.  
CAPCOM Tranquility, Houston. Request  
rendezvous radar breakers in about now.  
CAPCOM Columbia, Houston. Request  
OMNI D - OMNI DELTA.  
CAPCOM Tranquility Base, Houston.  
Request you start the warmup on the rendezvous radar.  
TRANQUILITY Roger.

END OF TAPE

TRANQUILITY Houston, you copying noun 93?  
CAPCOM Tranquility, affirmative. Go.  
TRANQUILITY Roger, we'll get a torque.  
CAPCOM Houston, roger.  
CAPCOM Tranquility Base, Houston.  
Columbia will be overhead at 122 plus 22 plus 51. His LOS  
will be 29:35. Over.  
TRANQUILITY Roger.  
TRANQUILITY Houston, we'd like to check  
this on the tape meter against the AGS. We'll go back to  
altitude - altitude rates as soon as the rate starts to  
build up. Over.  
PAO This is Apollo Control. We have  
confirmation of radar lock on.  
TRANQUILITY On second thought, since that  
will take the range rates I guess we'd better not do that.  
And for this range that the AGS are showing now 425 miles  
with a signal strength of 2.2. It looks like we ought to  
proceed on this. Over.  
CAPCOM Roger. Stand by one. Tranquility  
affirmative. Proceed.  
TRANQUILITY Are you getting the information  
on the downlink now?  
CAPCOM Tranquility affirmative, and  
we're sailing. We've got 4 point so far, and it's looking good.  
TRANQUILITY Okay, what do you people think  
about calling up a VERB 83?  
CAPCOM - Tranquility, Houston. Stand  
by now. We're getting the data now. We're checking on the  
VERB 83.  
TRANQUILITY And we expect that we may lose  
lock when it passes overhead because of the max rate that  
the radar has.  
CAPCOM Tranquility, Houston. Negative  
on VERB 83.  
TRANQUILITY Understand.  
TRANQUILITY We just lost lock.  
CAPCOM Tranquility, Houston. Go.  
COLUMBIA They just lost lock.  
CAPCOM Roger. We had about 20 some  
points before you said that, and for your information, the  
reason the AGS is a little different there - the reason the  
AGS is a little different is because the K factor is a  
little bit wrong.  
TRANQUILITY Has he already gone over - okay, has  
he already gone overhead, or do you want us to try and get  
in lockon again?  
COLUMBIA Houston, Columbia. You got  
NOUN 49. Five good marks.

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CAPCOM                    Tranquility, affirmative. Try  
to lock on again, and you'll lose him again at about 29 minutes  
and 35 seconds.

TRANQUILITY              Okay, you have a real quick  
procedure how to do that.

CAPCOM                    Columbia, Houston. Say again  
about your NOUN 49.

COLUMBIA                  I say I got 5 good marks. You  
got NOUN 49. When you get everything you need on the downlink  
let me know, over.

CAPCOM                    Columbia, Houston. Stand by one.

END OF TAPE

TRANQUILITY Ron, did you say on the 526 alarm  
to proceed or do a VERB 32?  
CAPCOM Roger. (garbled) Radar thinks the range  
is greater than 400 miles now.  
CAPCOM Tranquility Base, Houston. Recommend  
you terminate P22. Over.  
TRANQUILITY Roger, will do.  
CAPCOM And Columbia, Houston, same for you. You  
can terminate P22.  
COLUMBIA I have. I'm already passed it.  
CAPCOM Roger.  
COLUMBIA Up standing P22 here a second just to record  
the NOUN 89 and then over VERB 34.  
CAPCOM Columbia, Houston. Roger, we copy, and  
that's good.  
CAPCOM Tranquility, Houston.  
TRANQUILITY Roger, go ahead.  
CAPCOM Roger. Request S-band function switch to  
RANGE. We're going to do some ranging on you. Also I have  
an updated AGS K factor when you are ready to copy. Over.  
TRANQUILITY Roger, go ahead with the K factor.  
CAPCOM Roger. 119 plus 59 plus 59.92. Over.  
TRANQUILITY Roger, a little closer this time.  
CAPCOM That's (garbled)  
TRANQUILITY 119 59 5992. Over.  
CAPCOM Tranquility, Houston. Readback correct.  
CAPCOM Columbia, Houston. (garbled) the K factor.  
COLUMBIA Roger.  
COLUMBIA This is Columbia. Go ahead. And I'd  
like to know about this P52 coming up. Is that the one I  
just completed or do you want a pair of them back to back?  
CAPCOM Columbia, Houston. You do not need to do  
another P52 unless you want to, break, and also Columbia, when  
you get a chance request bat C and a pyro readout. Over.  
COLUMBIA Bat C says 37 volts even. Pyro A, 37.  
Pyro B, 37.  
CAPCOM Columbia, Houston. Roger, we copy. Thank  
you.  
COLUMBIA That bus B is 37. Bat bus A is 36 or I'd  
think the gauge was stuck.  
CAPCOM Roger, and you're looking good to us,  
Columbia.  
COLUMBIA Yes, sir. Keep it that way.  
COLUMBIA Columbia is coming up on a VERB 45  
enter to reset the surface flag.  
CAPCOM Columbia, Houston. Negative. Stand by  
on the VERB 45.  
COLUMBIA Roger that.  
COLUMBIA And a crew status report from Columbia.  
I figure I got about 5 hours good sleep although you guys  
probably know better than I do.

CAPCOM Columbia, roger we copy.  
CAPCOM Columbia, Houston. We've got a couple more vectors to send up to you. They'll be coming up shortly and then you do the VERB 45 after you get those in. Over.

COLUMBIA Okay, that's fine. Just wanted to make sure we're both in sync on the order.

CAPCOM Roger.  
CAPCOM Columbia and Tranquility Base, this is Houston. In case you haven't noticed, the MSFN relay is not activated, so I can go ahead and relay anything if you want to talk directly.

COLUMBIA Columbia, Roger.  
TRANQUILITY Houston, Tranquility. Be advised we've got -

COLUMBIA (garbled)  
TRANQUILITY - - showing red right now. We just put a VERB 77 in. I believe that there's (garbled)

CAPCOM Tranquility Base, Houston. We've got a lot of static down here. Could you say again?  
TRANQUILITY Roger. We have 4 pressure talkbacks indicating red. We still have the circuit breakers out as of right now. I believe at this moment we have just entered VERB 77 on Tape 5052 and are ready to proceed with the hot fire. Is it normal to have these 4 red flags? Over.

CAPCOM Tranquility Base, Houston. We think that's okay. Go ahead and reset them and press on with the hot fire. Over.  
CAPCOM (garbled)

END OF TAPE

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CAPCOM Columbia, Columbia, Houston, request  
POO in accept, and we'll send some state vectors up to you.

COLUMBIA Very good, POO in accept.

EAGLE Houston, Tranquility. I used the  
Capella in the last siting, and it's a good ways near the edge.  
A good ways away from the center of the detent 4. I'm wondering  
if it would pay any to use Alpheratz at star number 1. It  
might be a little closer, however, it would delay things a  
little, since I'd have to designate the radar out of the way,  
over.

CAPCOM Tranquility, roger, we copy, stand by 1.  
And break, break, Columbia. We're having a little trouble  
getting the stuff in there, request high gain, pitch minus 20  
yaw plus 250, over.

CAPCOM And Tranquility, Houston, we prefer to  
save the time press on with Capella, over.

EAGLE Roger.

CAPCOM And Tranquility, Houston, the RCS check  
looks mighty fine to us.

EAGLE It looks good up here.

CAPCOM Columbia, Columbia, Houston, over.

CAPCOM Columbia, Houston, over.

CAPCOM Columbia, Houston, in a blind high gain  
pitch minus 20 yaw plus 150.

EAGLE Houston, Tranquility, could you give me  
the fixed portion of the ascent pad so I can load it in  
for P57, over.

CAPCOM Tranquility, roger, stand by 1. We  
want to wait on that P57 until about TEC minus 50 minutes,  
over.

EAGLE Roger.

CAPCOM Columbia, Columbia, Houston, over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 11:20 GET 122:48 401/1

CAPCOM Columbia, Columbia, Houston. Over.  
TRANQUILITY Houston, Tranquility. It turned  
out detent 4 isn't useable anyway, with the yaw that we have  
because the earth appears in both detent 2 and detent 3.  
CAPCOM Tranquility Base, Houston. Roger.  
CAPCOM Columbia, Houston. Over.  
CAPCOM Tranquility, Houston. I have  
your LM ascent and CSI data pads when you are ready to copy.  
TRANQUILITY We're ready to copy.  
CAPCOM Roger. LM ascent pad. TIG 1242200  
00 NOUN 76 5534900322 plus 0017 DEDA to 47 plus 37104 minus 70470  
plus 58604 plus 56936. Your LM weight 10837. Your T-14  
126 plus 20 plus 12. Over.  
TRANQUILITY What figures the cross range and  
NOUN 76?  
CAPCOM Roger. Your cross range for  
NOUN 76 - by the way we may update this later - but now  
it is plus 0017. Over.  
TRANQUILITY Roger. Readback follows. TIG 124  
2200005534900322 plus 0017 plus 37103 minus 70470 plus  
58604 Plus 56936. LM weight 10837. T-14 126 20 12.  
Go.  
CAPCOM Tranquility, Houston. Roger,  
your readback correct. Now I have your CSI data pad.  
TRANQUILITY Going to CSI pad.  
CAPCOM Roger. CSI pad. TIG to CSI  
125193470 TIG TPI 126570000 NOUN 810532 plus 0000 FDAI NA  
DEDA 373 03196, DEDA 275 04170 NOUN 86 plus 0532 plus 0000  
plus 0012. Tranquility readback.  
TRANQUILITY CSI pad follows. TIG 125193470  
TIG TPI 126570000 NOUN 810532 plus 0000 35303196 27504170  
NOUN 86 plus 0532 plus 0000 plus 0012. Go.  
CAPCOM Tranquility Base, Houston. Your  
readback is correct. And, Tranquility, no need for  
any gyro compensations. It's GO.  
TRANQUILITY Roger. Understand.  
CAPCOM Columbia, Houston. Over.  
CAPCOM Columbia, Houston. Request high  
gain. PITCH, minus 30. YAW, plus 170. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, CDT 11:30, GET 122:58, 402/1

CAPCOM - zero. Over.

COLUMBIA Houston, Columbia on the high gain.  
Over.

CAPCOM Roger, Columbia. We still need to finish your uplink there, and then I have your CSI and PTI times and also the liftoff.

COLUMBIA Go ahead, ready to copy.

CAPCOM Roger. LM ascent liftoff time 124 22 00 00. Your CSI tik say again CSI tik 125 19 34 70. Your tik of TPI 126 57 00 00. And the LM's NOUN 81 values for CSI 05 32 - that's 53.2 for DELTA V X, DELTA V Y all zeroes. Columbia, Houston. Over.

COLUMBIA Roger, readback liftoff tik 12422 even, CSI 125 193470, TPI 126 57 even, LM 981 for CSI 53.2 DELTA V X. Over.

CAPCOM Columbia, Houston. Roger, your read-back correct.

CAPCOM Columbia, Houston. We're coming up with your second load now.

CAPCOM Columbia, Houston. The computer is yours, and you can do your VERB 45 enter now.

COLUMBIA Roger. Going into BLOCK and VERB 45 enter.

CAPCOM Roger.

COLUMBIA How's the black team today? All prime and raring to go?

CAPCOM You bet there Mike.

PAO This is Apollo Control. Some 5 minutes 35 seconds away from loss of signal with the spacecraft Columbia before it goes on the far side of the moon on the 24th revolution. 1 hour, 18 minutes until ascent ignition and following that the rendezvous sequence completed with the docking at 128 hours approximately. We'll continue to monitor air to ground here as data is passed up to the crew for the upcoming day's activities. Apollo Control standing by at 123 hours and 3 minutes.

CAPCOM Columbia, Houston. About 3 minutes LOS and I have your consumables update.

COLUMBIA Ready to copy.

CAPCOM Roger. At 123 plus 00, RCS total minus 7 percent, ALPHA minus 12 percent, BRAVO plus 4.5, Charlie minus 7, DELTA minus 6.5. Your hydrogen total minus 1.4 pounds, oxygen plus 1.7. Over.

COLUMBIA Whoever figured those hydrogens and oxygens out a couple of days ago must have known what he was doing.

CAPCOM Okay, I think I read that oxygen as a plus 17 pounds.

COLUMBIA Roger, still close.

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CAPCOM Eagle and Columbia, this is the back-up crew. Our congratulations to yesterday's performance, and our prayers are with you for the rendezvous. Over.

EAGLE Thank you, Jim.

COLUMBIA Thank you, Jim.

EAGLE Glad to have all you beautiful people looking over his shoulder. We had a lot of help down there, Jim.

END OF TAPE

TRANQUILITY (garbled) looking over his shoulder.

CAPCOM We had alot of help down there, didn't we.

PAO This is Apollo Control. We've had loss of signal with Columbia going behind the moon. Toward the end of that pass, Apollo 11 backup commander, Jim Lovell, who's had some experience in Lunar missions came up with his congratulations with his job-well-done. He mentioned that he would be here giving moral support during the rendezvous sequence to follow. There are likely to be further communications with Eagle until the command module comes around the corner again some 44 minutes from now. We'll bring the circuit back up as communications resume perhaps playing catch up with tape recordings, and at 123 hours, 10 minutes ground elapsed time, 1 hour, 11 minutes to ignition this is Apollo - stand by. We may be - let's listen in again.

TRANQUILITY Going to give you a few comments with regards to the geology question of last night. We are landed in a relatively clear crater field of elongate secondary - circular secondary craters most of which have rims irrespective of their rays and irrespective of their size. That's not universally true. There are a few of the smaller craters around which do now have a discernable rim. The ground mass throughout the area is a very fine sand to a silt. I say the thing that would be most like it on earth is the powdered graphite. Immersed in this ground mass are a wide variety of rock shapes, sizes, textures, rounded and angular, many with varying inconsistencies as I said I've seen plain - what looked to be plain basalt and particular basalt. Others with no crystals, some with small white phenocrysts, maybe one to less than 5 percent, and the boulders we are in a boulder field where the boulders range generally up to 2 feet with a few larger than that. Now, some of the boulders are lying on top of the surface, some are partially exposed, and some are just barely exposed, and in our traverse around the surface and particularly working with the scoop we can run into boulders below the surface probably buried under several inches of the ground mass.

CAPCOM Tranquility, Houston. Roger, very fine description.

TRANQUILITY Now I suspect this boulder field may have some of its origin with this large sharp edge rocky rim crater that we passed over in final descent. Now yesterday I said that was about the size of a football field, and I have to admit it was a little - little hard to measure coming in, but I thought that it might just fit in the astrodome as we came by it, and it runs in the

TRANQUILITY            vicinity of the - this rocky rim crater are much larger than these in this area. Some are 10 feet or so and perhaps bigger, and they are very thickly pocolated out to about one crater diameter beyond the crater rim. Beyond that there is some diminishing, and even out in this area the blocks seem to run out in rows and irregular patterns, and then there are spans between them where there are considerably less surface evidence of the hard rocks. Over.

CAPCOM                Tranquility Base, Houston. We copy. Thank you very much. And Tranquility Base, we're through with the ranging. Take your S-band function switch to off reset.

TRANQUILITY           Roger.

CAPCOM                And Tranquility, I have a LM consumables update for you.

TRANQUILITY           Roger, ready to copy.

CAPCOM                Okay, at 123 plus 00, RCS alpha 78 - 78 percent PQMD, BRAVO is 76 percent PQMD, descent 02 is 62 percent - 62 percent, descent ampere hours are 590, 590 remaining, ascent ampere hours are 574, 574 remaining. Over.

TRANQUILITY           Roger, copy. That's very good. Thank you.

CAPCOM                Roger.

END OF TAPE

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CAPCOM Tranquility base, Houston.  
EAGLE Go ahead Houston.  
CAPCOM Roger, for your P57 errors, we did a  
looking around, and it looks like Sirius and Rigel at a detent 6  
would be real good on that. Sun angle on Sirius is about  
43 degrees, and on Rigel it's about 55 degrees, over.  
EAGLE Roger, Houston, the only trouble is that  
the sun is in number 5, the closed one. And it appears to also  
be close enough to detent 6 to shine on the far side of the  
cone. And it completely obscures detent 6. I'm unable to use  
that at all.  
CAPCOM Okay, we understand, out, and thank you.  
CAPCOM Tranquility, Houston, for your information  
the circuitry looks real fine on that ascent engine arm circuit  
breaker.  
EAGLE Roger, I don't think I could get it out  
now if I wanted to.  
CAPCOM Roger, we copy.  
EAGLE And it looks like in detent 6 I can  
pick up Venus right at the fringe, but I can't get anything  
else.  
CAPCOM Roger.  
EAGLE And by the way, Houston, our EVA  
antenna did return.  
CAPCOM Roger, mighty fine, thank you.  
CAPCOM Tranquility, Houston.  
EAGLE Roger, go ahead.  
CAPCOM Roger, it looks like you're going to have  
to reposition the radar here. We suggest you may want to start  
your TIG minus 45 minutes, that point in the checklist at about  
TIG minus 50 over.  
EAGLE Roger. Why do you think I need to move  
the radar.  
CAPCOM Well, we thought that you probably  
wouldn't be able to get the star there.  
EAGLE On our detents, the radar can be pointing  
plus X, and I'll be using right rear, it's okay.  
CAPCOM Roger, that's fine then.  
PAO This is Apollo Control. Some 57 minutes  
22 seconds away from ignition on the LM ascent back into  
lunar orbit. Some 30 minutes away from acquisition of the  
spacecraft Columbia, as it comes around again on the 25th  
revolution. And the latest information from the scientific  
experiment placed on the lunar surface last night by the  
Apollo 11 crew, our Science Support Room reports receiving  
continous data from the Passive Seismic Experiment. The  
Passive Seismic Experiment is part of the early Apollo science  
experiment package which has the acronym ASEP. Recorded the  
astronauts footsteps on the moon; also sent down signals when  
the crew climbed up the ladder back into the Eagle, and recorded  
a strong signal when they expended Portable Life Support

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Backpacks and other pieces of equipment were jettisoned out Eagle's front hatch. Let's rejoin the conversation.

CAPCOM One more late checklist change there on rendezvous radar position for lift-off, over. - from phase surface 57.

EAGLE Roger, go ahead.

CAPCOM Okay, on surface 57 there on your VERB 21 NOUN 73, trunnion leave it 180, shaft we'd like 335, over.

EAGLE Roger, understand, shaft 335.

CAPCOM Roger, and if the durable doesn't quite hack it on lift-off, looks like the forward OMNI is good for about 30 to 60 seconds after lift-off. And the aft OMNI antenna is good for the rest of the ascent, over.

EAGLE Roger, copy.

EAGLE Houston, we've got 2 angles here at 3 minutes in ascent, would you confirm those. Pitch 134 and YAW minus 32, over.

CAPCOM Tranquility base, roger, we verify those are correct.

END OF TAPE

PAO This is Apollo Control. Here in mission control center Flight Director Glen Lunney is polling the various positions here in the control room on their readiness to go ahead with the ascent from this next pass as the command module comes around the moon, and we're some 53 minutes now away from ascent. Meanwhile back at the scientific experiment situation, another attempt is scheduled today to shoot another laser beam up to the laser retroreflector, which is the other part of the experiment package left on the moon. The seismic experiment will continue to record and send back measurements to mission control and will probably receive it's strongest signal when the ascent engine ignites and starts Eagle on it's way into lunar orbit and rendezvous with Columbia. There's considerable amount of conversation going on with the crew even though command module Columbia is behind the moon at this time. Rather than disconnect the air-ground line and be in a tape play-back mode, we'll leave a circuit up all the way through to loss of signal on the next rev when both spacecraft will go behind the moon. At 123 hours, 29 minutes, and standing by, this is Apollo Control.

CAPCOM Tranquility Base, Houston.

TRANQUILITY Go ahead.

CAPCOM Roger. Eagle's looking real fine to us down here. We have a fairly high confidence that we know the position of the LM. However, it is possible that we may have a plans change, but in the worst case it would be up to 30 feet per second, and of course we don't expect that at all.

TRANQUILITY Okay.

TRANQUILITY Houston, Tranquility Base. Since we've still got plenty of time I think I'll go ahead and recycle on 604.

CAPCOM Tranquility, Roger, that's okay with us, and we assume that the primary canister is still aboard. Is that correct?

TRANQUILITY We have one primary canister on board and one secondary. The other primary is out in front of the Z plus B pad. Over.

CAPCOM Roger, we copy. Thank you.

TRANQUILITY The things looks consistant today.

CAPCOM That's affirmative, by gosh. Looking great.

TRANQUILITY Houston, did you copy 905 and are you looking at 93? Over?

CAPCOM Tranquility Base, it's beautiful.

TRANQUILITY Okay, we'll proceed.

CAPCOM Roger.

TRANQUILITY I know where to start, I'm not sure the PGNCs know where gravity is.

CAPCOM Okay.

TRANQUILITY Houston, these are your angles, not ours.

END OF TAPE

TRANQUILITY Houston, these are your angles,  
not ours.  
CAPCOM Roger. I quoted -  
TRANQUILITY that'll change your modifications  
angles.  
CAPCOM Tranquility, Houston. Recommend  
334 and that should just keep it out of the limit.  
TRANQUILITY Okay.  
PAO This is Apollo Control. We are  
some 3 minutes to acquisition time for Columbia as it  
comes around on the 25th lunar revolution. We have had  
acquisition with Columbia. Some 26 minutes away from  
ignition time on the ascent burn which will place Eagle  
back into lunar orbit. Here we go.  
COLUMBIA - DELTA. Over.  
CAPCOM Columbia, Houston. Roger. Loud  
and clear. If you would like to take it down, we have the  
latest position of Tranquility Base. Over.  
COLUMBIA Go ahead.  
CAPCOM Roger. A step west of West Crater,  
Juliette .5/7.7. Over.  
TRANQUILITY I understand that it is just west  
of the crater which is at Juliette .5/7.7. Is that correct?  
CAPCOM Columbia, Houston. That is correct.  
COLUMBIA Thank you.  
CAPCOM Tranquility Base, Houston.  
TRANQUILITY Roger. Because of the lower load  
with the rendezvous off, we'd like to have Battery 5 and  
6 on the line now, 1 and 3 off. Over.  
TRANQUILITY It worked.  
CAPCOM Roger. Thank you.  
PAO This is Apollo Control in Mission  
Control. The lunar orbit chart on the center plot board  
has disappeared. We now have the various scribing plotters  
projecting on the center plot board to show the ascent.  
All of these lines and the various colors that are scribed  
on by the three sources of primary guidance system, the  
abort guidance system and the manned space-wide network  
all mean something to Flight Dynamics Officer. Let's  
rejoin the conversation.

END OF TAPE

COLUMBIA Columbia is rolling inertially at lift-off attitude, my DAP is configured as my procedures at a time of 124 02.

CAPCOM Columbia, Houston, roger, we copy you.

COLUMBIA I'm using B and D roll.

CAPCOM Tranquility, Houston, say again.

EAGLE Houston, we were not calling.

CAPCOM Roger, Columbia, was that Bravo and Delta roll, over.

COLUMBIA Columbia, affirmative.

CAPCOM Roger.

CAPCOM Columbia and Tranquility, I'll give you a mark at 20 minutes to go, and that's in about 20 seconds.

CAPCOM Stand by. Mark 20 minutes.

COLUMBIA Columbia, roger.

CAPCOM Tranquility base, Houston.

EAGLE Go ahead.

CAPCOM Roger, just a reminder here, we want to make sure you leave the Rendezvous Radar Circuit Breakers pulled; however, we want the Rendezvous Radar Mode Switch in LGC just as it is on Surface 59.

EAGLE Okay.

CAPCOM Tranquility base, Houston.

EAGLE Roger, go ahead.

CAPCOM Roger, our guidance recommendation is PGNS, and you're cleared for take off.

EAGLE Roger, understand. We're number 1 on the (garbled).

CAPCOM Roger.

PAO This is Apollo Control. We have confirmation on the ground that the ascent propulsion system propellant tanks have been pressurized.

EAGLE Houston, Tranquility. We're not sure that we got number 2 tank to fire. It's still showing the high pressure.

CAPCOM Roger, we confirm that. Try it again.

EAGLE Okay, we'll go to number 2 this time.

CAPCOM Roger, we concur.

EAGLE Roger. No problem.

PAO This is Apollo Control. Network controller just informed the flight director that items called battle shorts have been installed around the network. These are mechanical shorts of critical power supplies and transmitters and the like, so that before they will go off-line, they'll actually burn up in critical phases of the mission. They want to get as much data as possible through the burn, so for that reason any circuit breaking function of the equipment is inhibited with these battle shorts. They're not a piece of apparel. In the upcoming ascent some 14 minutes from now, almost 5000 pounds of propellant will be run through the ascent engine to propel the lunar module upper stage or

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PAO ascent stage to velocity - total velocity of 6068 feet per second. Go through a vertical rise phase at about 50 seconds after liftoff - liftoff will begin pitching over, and some 168 miles down range will be inserted into lunar orbit at about 60 000 feet above the surface. With an apolune of approximately forty -

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 12:40 GET 124:08 408/1

PAO - and about 60 000 feet above the surface. With an apolune of approximately 45 nautical miles half a revolution later on the far side of the moon. We will continue to monitor air-ground here. We are some 1 hour away from loss of signal with the lunar module after its insertion. Eagle now 13 minutes away from - 13 minutes, 23 seconds away from ascent ignition. 124 hours, 8 minutes ground elapsed time in the mission. Apollo Control standing by.

TRANQUILITY Houston, there looks like there is very little difference between the two.

CAPCOM Roger.

TRANQUILITY We've got No. 2 reading 3050 and No. 1 is reading 3000 and it drops down to 2990. So I am not sure that it is really indicative that it did go. Over.

CAPCOM Roger. We copy and we agree.

TRANQUILITY Okay. I will assume that we will GO for liftoff and will proceed with the ascent B.

CAPCOM Roger. That is correct, and we will go ahead and watch tank 2. If tank 2 doesn't decrease we will tell you to close the ascent feeds and open the shut-off. Over.

TRANQUILITY Okay. Ascent Beeville and shutoff for close.

CAPCOM Roger.

TRANQUILITY I've got the cross feed on.

CAPCOM Tranquility Base, little less than 10 minutes here. Everything looks good and we assume the steerables in track mode auto.

TRANQUILITY Roger, it is in track mode auto.

CAPCOM Roger.

TRANQUILITY And both ED batteries are GO.

CAPCOM Tranquility, Houston, roger.

ALDRIN Neil, I'm reading you on VHF. You sound good.

ARMSTRONG Yes, sir. Couldn't be better.

It is just purring along.

ARMSTRONG Bait scale 25.

ALDRIN 25.

ARMSTRONG Ascent translation 4 jets.

Balance couple on.

ALDRIN Balance couple on.

ARMSTRONG BTCHS, button reset, board to board stage reset.

ALDRIN Reset.

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ALDRIN Reset.

ARMSTRONG Headband minimum, bat control, mode control, mode control auto,

ALDRIN Auto, auto.

PAO Crew of Eagle going through their preadmission checklist.

ARMSTRONG Neil standing by for 2 minutes to - for the guidance steering in the AGS.

END OF TAPE

CAPCOM Eagle, Houston, you're looking good to us.

TRANQUILITY Roger.  
PAO The guidance computer aboard the LM, or aboard Eagle will be loaded with the program 12, powered ascent guidance. We'll continue to monitor now at 3 minutes 12 seconds away from ignition as the crew of Eagle goes through their prelaunch checklist.

TRANQUILITY (garbled)  
PAO Coming up on 2 minutes, Mark T minus 2 minutes.

TRANQUILITY Watch your guidance steering in the AGS.  
TRANQUILITY The master arm on.  
PAO Guidance reports both navigation systems on Eagle are looking good.

TRANQUILITY 50 blanks.  
TRANQUILITY (garbled)  
TRANQUILITY Forward 8, 7, 6, 5, abort stage, engine arm ascent, proceed, That was beautiful. 26, 36 feet per second up. Be advised of the pitch over. Very smooth. Aldrin's (garbled) logged. Very quiet ride. There's that one crater down there.

PAO 1000 feet high, 80 feet per second vertical rise.

CAPCOM Eagle, Houston. Request manual start over right.  
EAGLE Roger.  
PAO 2600 feet altitude.  
EAGLE (garbled)  
CAPCOM Eagle, Houston, 1 minute and you're looking good.

EAGLE Roger.  
PAO 130 feet vertical rise rate.  
EAGLE - a little bit of slow wobbling back and forth. Not very much thruster activity.

CAPCOM Roger, mighty fine.  
EAGLE (garbled) 150 up, beautiful. (Garbled) down. And AGS agrees within a foot per second.

CAPCOM Eagle, Houston, you're looking good at 2. AGS, PGNCS, and MSFN all agree.  
EAGLE We're at 3000, 170 up, beautiful. 14 (garbled) And a foot per second again AGS to PGNCS.  
EAGLE Dead band looks like it's holding good, Houston.

CAPCOM Roger, we concur. It's great.  
EAGLE 1500, 185.  
PAO Aldrin is reading the horizontal velocity first and then the vertical velocity. It's now 1424 feet per

PAO second vertical velocity, 187 vertical  
velocity.  
CAPCOM Eagle, Houston, you are GO at 3 minutes.  
Everything is looking good.  
EAGLE Roger.  
EAGLE We are coming up to a (garbled) state  
max now.  
EAGLE We're going right down U.S. 1.  
CAPCOM Roger.  
PAO Height now approaching 32 000 feet.  
CAPCOM Eagle, Houston, 4 minutes you're going  
right down the track. Everything's great.  
PAO Horizontal velocity approaching 2500 feet  
per second.  
EAGLE That's Sabine off to the right now.  
CAPCOM Roger.  
PAO Some 120 miles to go till insertion.  
EAGLE 240 to go.  
EAGLE There's Ritter out there. (garbled)  
there it is right there. (garbled) Man, that's impressive.  
looking, isn't it?  
CAPCOM Eagle, Houston, you're looking good.  
EAGLE - 3, 9, 55.  
PAO All 3 data sources are agreeing quite  
closely here. The 3 color plot board in front of Mission  
Control here is almost superimposed as each of the 3 colors  
are scribed on this scribing plotter.  
EAGLE (garbled) off to the right.  
CAPCOM Eagle, Houston. You're still looking - -

END OF TAPE

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CAPCOM Eagle, Houston. You're still looking mighty fine.

EAGLE Roger, good agreement in DELTA-V to go and both AGS and PNGCS.

CAPCOM Roger.

PAO One minute to go in the burn. 4 482 feet per second, horizontal velocity.

EAGLE About 800 to go. 700 to go. Okay, I'm opening up the main shutoffs. Ascent feed closed, pressure's holding good, crossfeed on, 350 to go. Stand by on the engine arm. 90, okay, off, 50, shutdown. We got 53373, 32.8 feet per second, 60 666.

CAPCOM Eagle, roger. We copy. It's great. Go.

EAGLE And we got - got our residuals.

Now take -

CAPCOM Eagle, Houston. Trim residuals.

EAGLE (garbled)

PAO Showing a paraloon of 9.1 nautical miles, apaloon of 47.2 nautical miles on the PNGCS. All three systems are GO. Shutoff velocity showing about 5,537 feet per second plus or minus a foot or so on each of the three systems.

CAPCOM Eagle, Houston. Trim looks good. That's good.

EAGLE Eagle's monitor (garbled) 480 feet per second.

CAPCOM Okay, that sounds a little - little on the high side.

EAGLE (garbled) Okay. Okay, Houston.

We show 47.3 by 9.5.

CAPCOM Roger. 47.2 by 9.5.

EAGLE AGS has 9.5, 46.6.

CAPCOM Eagle, Houston. Copy. Eagle, Houston. Request the abort phase 3 test. You can stop to reset remote control to at hold when you get a chance to.

EAGLE Roger.

PAO Here in Mission Control the scribing plotter showing the velocity in height - here we go again.

CAPCOM Let's proceed with P52 as per nominal.

EAGLE Roger, Houston. Eagle is back in orbit and left Tranquility Base and leaving behind a - a replica from our Apollo 11 launch (garbled).

CAPCOM Eagle, Houston. Roger, we copy. The whole world is proud of you.

EAGLE We need a lot of help.

COLUMBIA Eagle, Columbia. I got 470 now for (garbled) and I just broke lock. Could you hold silent

COLUMBIA for a few seconds here while  
I reacquire. Columbia's reacquired you.

PAO Here in Mission Control the  
scribing plotters have been replaced with the lunar orbit  
tracking chart showing the Eagle behind Spider some 20 degrees  
in longitude. Flight Operations Director, Chris Kraft,  
commented that he felt like some 500 000 000 people around  
the world are helping push Eagle off the moon and back into  
orbit. We're continuing to monitor transmissions between  
the ground and Eagle and Columbia. Apollo Control standing  
by.

CAPCOM Columbia, Houston. Request  
POO and accept, and we'll give you a good GO LM vector.  
Over.

CAPCOM Eagle, Houston. You can go  
ahead and turn your update link switch off.

EAGLE Roger, it's off.

CAPCOM Roger.

END OF TAPE





me to continue making sextant marks or do nothing. I'm supposed to be doing VHF marks only, and it's for the next 6 or 7 minutes.

CAPCOM Columbia, Houston, roger, we copy.

And Eagle, looks like the best antenna would be forward for the LM. And break, Eagle, we'll omit you're loading of the TPI tig and P32, could you confirm you've done that.

CAPCOM Columbia, Houston, recommend you take sextant marks, and do not reinitialize, over.

COLUMBIA Roger, Houston, Columbia, got the VHF ranging back now, I'll stick with the nominal, thank you.

CAPCOM Roger, mighty fine.

EAGLE Columbia, reading you loud and clear now, Eagle.

CAPCOM Columbia, Houston.

COLUMBIA Go ahead, Houston.

CAPCOM Roger, Mike, you can go ahead and get as many VHF and sextant marks as you can here in this period of time.

COLUMBIA Roger, out. I've just got time for maybe 2 sextant marks, then get on with the final count.

CAPCOM Eagle and Columbia, about 1 minute till LOS there on Columbia. It looks like we have about 51.5 for CSI and we tend to confirm you're Y dock. And break, for Eagle verify VHF Bravo transmitter is OFF.

EAGLE Roger, VHF Bravo is OFF.

CAPCOM Eagle, Houston. Recommend aft OMNI and are you go for CSI, so we can let Columbia know, over?

EAGLE Roger, we're GO for CSI.

CAPCOM Columbia, Houston, did you copy, Eagle is GO for TSI.

COLUMBIA No, I did not copy. I'm afraid they're only intermittent but thank you.

CAPCOM Roger.

PAO This is Apollo Control. Columbia has gone behind the moon. Still a little over a minute left until Eagle goes behind the moon. We'll catch these last few minutes of tracking and any possible conversation.

CAPCOM Eagle, Houston. We'll see you coming around the other side. Your AOS time -

END OF TAPE

CAPCOM Eagle, Houston, we'll see you coming around the other side. Your AOS time is 1 minute ahead of the flight plan.

EAGLE Okay, thank you.

PAO This is Apollo Control. We have had loss of signal with Eagle. Quite scratchy as Eagle went over the hill to complete the 25th lunar revolution as it gets to the midpoint on the lunar far side. Ascent burn just completed went quite well on time at 124 hours 22 minutes 0 seconds ground elapsed time. Coming up on this rev, approximately 10 minutes from now as a matter of fact, will be the concentric sequence initiate maneuver, CSI, which will raise the Eagle's perilune to some 45 nautical miles. Eagle now is in an orbit measuring 9.4 nautical miles at insertion or perilune, and 46.7 at apolune. This CSI maneuver will be made approximately at apolune. Therefore, the effect takes place 180 degrees later and has the effect of raising perilune to the desired 45 nautical miles. This maneuver will take place at 125 hours 19 minutes 34.7 seconds. He will have a DELTA-V or velocity change of 51.5 feet per second. All of these maneuvers, incidentally, in the rendezvous sequence by Eagle will be made by using the reaction control system of Eagle. Following the CSI at 126 hours 18 minutes 0 seconds a 9.2 foot per second burn, probably mostly a radial burn, at 126 hours 18 minutes will twist the Eagle's orbit to equal distance from the orbit of Columbia, what they call a constant DELTA height, or CDH maneuver. At 126 hours 57 minutes 00 seconds, terminal phase initiation, TPI. In this maneuver the crew visually thrusts along the line of sight toward Columbia when the line of sight is some 27 degrees above the local horizontal. This maneuver will have a magnitude of about 24.9 feet per second, and, in turn, it raises the apolune to 60.5 nautical miles, which is approximately the altitude Columbia's orbiting. Terminal phase finalization. TPF 127 hours 39 minutes 39.2 seconds. This is the start time for a series of small burns which are a combination of midcourse correction and velocity match maneuvers to bring Eagle in with Columbia and match the velocity so that they stationkeep for a short period for photography, etc., and move on in to docking at approximately 128 hours ground elapsed time. In all of these maneuvers Mike Collins aboard Columbia is spring loaded to do what is called a mirror image maneuver approximately a minute after the Eagle is scheduled to make its maneuver, and if for some reason Eagle can not make the maneuver, Collins would do the exact same maneuver only in reverse so that Columbia would in effect begin a CSM active rendezvous with Eagle. As Eagle went over the hill on the 25th revolution, a velocity was being measured at 5410 feet per second. Eagle's weight somewhat lighter than when it started out in excess of

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 13:40 GET 125:08 413/2

PAO                            32 000 pounds, it's now shrunk to some 5885 pounds.    Some 39 minutes 20 seconds away from acquisition of Columbia.    41 minutes 45 seconds from acquisition of Eagle as the 2 vehicles come around on the 26th revolution.    The crew will likely describe how the CSI burn went, which is some 5 minutes away from this point, and at 125 hours 14 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. 125 hours, 52 minutes ground elapsed time. Less than 1 minute away from the acquisition of the spacecraft Columbia coming around on the near side of the moon on the twenty sixth revolution. Some 3 minutes, 11 seconds away from Eagle's appearance on the lunar front side. Stand by here for word. We have acquired data and voice link. Spacecraft Communicator, Ron Evans, is standing by for AOS so that he can pass some information to the crew of the two spacecraft. We have AOS of the spacecraft, Columbia.

CAPCOM Comm, AOS, data.

CAPCOM Columbia, Houston. Have you talked to Eagle? Do you have comm with Eagle now?

COLUMBIA Houston, Columbia. Over.  
Houston, (garbled) Columbia. Over. Houston, Columbia. Over.

CAPCOM Columbia, Houston. You're very weak. Say again.

COLUMBIA Roger. Houston. Columbia PSI nominal no plane change. Everything's going beautifully, and the LM seems to be (garbled).

CAPCOM Roger. Columbia, Houston. You're about 1 by I couldn't make you out. I can't understand.

COLUMBIA Houston, Columbia. How now? (garbled). Houston, Columbia. Over. Houston, Columbia. Over.

EAGLE Houston, this is Eagle. Over.

CAPCOM Hey, Eagle. Houston loud and clear. Columbia was very weak. We were unable to read him.

EAGLE Roger. We saw you come up over the horizon and it looks like you had a laser operating. Could you confirm that?

CAPCOM Eagle, Houston. Stand by. We'll check it. And Eagle, Houston. Can you give us a burn report?

EAGLE Roger. Stand by. Okay, the CSI burn was on scheduled time of 125193470, 51.5 feet per second was our solution. After changing residuals a little bit, we ended up with a minus .2 plus .7 and minus .1. And in the AGS at that time we had plus .4 plus .9 plus .3.

CAPCOM Eagle, Houston. We copy. Any plane change? Over.

EAGLE No, there's no plane change on PSI, and CSM had 2.3 foot per second burn. We had a 2.9 and we elected to postpone that. Over.

CAPCOM Roger. We copy, Eagle. Over.

COLUMBIA Houston, are you reading Columbia now? Eagle, how about making a connection for me. Will you please?

EAGLE Roger. Houston, do you have some high gain angles for Columbia? Over.

CAPCOM Roger, Eagle. And Columbia stand by. We'll have them for you shortly. Eagle, Houston. Would you verify you switched lithium hydroxide canisters? Over.

EAGLE That's affirmative. We started getting an erratic indication on the primary so we switched to secondary, and it was a again erratic and I thought it might have been a sensor, but it's settled down now, and we're on the secondary. Over.

CAPCOM Roger. We copy. Mighty fine. Columbia and Eagle. Request omni Delta for Columbia.

COLUMBIA Roger, Houston. (Garbled).

EAGLE Houston. Columbia's been on DELTA, but he hasn't had much luck with you.

CAPCOM Eagle, Houston. Roger, we copy.

COLUMBIA Houston, you ready to copy our (garbled)? Okay, (garbled).

PAO This is Apollo Control. Columbia is now in an orbit measuring 56.6 nautical miles by 62.5 nautical miles, and the display here in mission control shows that the range from Eagle to Columbia of a tad over 100 miles. And about 99 feet per second closure rate.

CAPCOM We'd like to go ahead and try your lithium hydroxide on the primary and let us take a look at it down here. Columbia, Houston. Over.

CAPCOM Columbia, Houston. Over.

COLUMBIA (garbled).

EAGLE Houston, Eagle. Columbia's been reading you loud and clear on his omnis but he hasn't had any luck in transmitting to you.

CAPCOM Roger, Eagle. Mighty fine. We don't hear Columbia though.

EAGLE Okay.

END OF TAPE

EAGLE We're burning ours, Mike. Tainus 1.8.  
CAPCOM Eagle, Houston. (static).  
CAPCOM Columbia, Houston. Over.  
CAPCOM Columbia, Houston. You can go ahead  
and go to reacq in the high gain. We could get you then.  
COLUMBIA Do you have some angles for us, Houston?  
CAPCOM Roger, PITCH minus 30, YAW 180, for  
Columbia.  
EAGLE Okay, and what was your CDH solution,  
Mike?  
CAPCOM Roger, copy. Thank you.  
EAGLE And Houston, Eagle. Got an ECS flight  
a CO2 flight, pressure's reading about one half millimeter.  
CAPCOM Eagle and Columbia, Houston, roger.  
We copy.  
CAPCOM Columbia, Houston. Go.  
CAPCOM Eagle, Houston. We're sure that's a  
sensor problem. You can leave it on primary.  
EAGLE Okay.  
EAGLE Roger, we pulled the circuit breaker.  
CAPCOM Roger, Eagle.  
EAGLE And our water separator apparently  
isn't working too well. We're getting a lot of water through  
the suit limb and we've changed water separators but it doesn't  
seem to have improved the situation any.  
CAPCOM Eagle, Houston. Roger, we copy.  
COLUMBIA Eagle, Columbia standing by to back  
you up on the burn. Just let me know how it's going.  
EAGLE Okay. You want to know what our 981 is?  
COLUMBIA Ready to copy.  
EAGLE Okay, I think you already got the burn  
time, minus 8.1, minus 1.8, minus 18.2.  
COLUMBIA Okay, that's pretty close agreement.  
For burn time, I still have 126 17 46.  
EAGLE Roger.  
CAPCOM Eagle, Houston. For warm fueling,  
we are agreeing with your CDH.  
EAGLE Congratulations.  
EAGLE Unfortunately, the chart doesn't agree  
with us, because the range rate is 36 minutes off the chart.  
PAO Apollo Control here. Less than a minute  
remaining until the constant DELTA height or CDH maneuver. We'll  
continue to monitor the air-ground. This small magnitude  
radial burn to put Eagle in a orbit that's concentric with -

END OF TAPE

PAO - the Eagle in an orbit that's concentric with. Here we go. 30 seconds.

COLUMBIA Yes, I'm ready. Go ahead.

COLUMBIA Burn complete.

CAPCOM Burn complete.

COLUMBIA Thank you.

CAPCOM Eagle, Houston, when you get a chance are your LCG hooked up, and if so what does the LCG accumulator show?

PAO This is Apollo Control. Range now showing 91.3 nautical miles, range rate, rate of closure 119 feet per second.

COLUMBIA It sure is great to look down there and not see you.

EAGLE we think so

CAPCOM Eagle, Houston.

EAGLE Go ahead.

CAPCOM Roger. Did you copy on the LCG there and reading on the water accumulator?

EAGLE Yes.

EAGLE Roger, it is I'm just getting out a burn pad.

EAGLE Houston, the water accumulator is right on the line between the red and the green. Over.

CAPCOM Eagle, Houston. Roger, we copy.

CAPCOM Eagle, Houston.

EAGLE Houston, Eagle.

CAPCOM Roger. On the water problem, we can't add any thing more to it except the fact that it looks like the water accumulators are up to up to speed down here.

EAGLE Okay, it's not going to be too much trouble.

CAPCOM Roger.

EAGLE It's in one suit, too, for some reason.

CAPCOM Columbia, Houston. Our COMM problem was accredited to the ground station here.

COLUMBIA Good. Glad to hear it.

CAPCOM Roger. You're mighty fine now.

PAO This is Apollo Control. Range between Eagle and Columbia now showing 67.5 nautical miles. Range rate, closure rate, 121 feet per second.

EAGLE Range rate at 30.

COLUMBIA I have a TPI check when you guys want to compare them.

EAGLE Stand by.

EAGLE (garble) 198.

EAGLE Go ahead, Mike. What have you got?

COLUMBIA 127023450.

EAGLE You're about 32 seconds greater than we are.

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 14:50 GET 126:17 416/2

COLUMBIA Okay, fine.  
PAO This is Apollo Control, some 25 minutes now until the TPI, terminal phase initiation burn, just before loss of signal as both spacecraft go over the hill.  
PAO This is Apollo Control the black team of flight controllers here in Mission Control are more or less in an advisory capacity during this rendezvous sequence. They're actively computing maneuver times, but in the final analysis it's onboard computations by the crew of Columbia and Eagle which really bring about the rendezvous. Standing by.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, CDT 15:10, GET:126:37, 417/1

PAO which nearly bring about to rendezvous. Standing by at 126 hours 37 minutes ground elapse times. Some 24 minutes away from ignition on the thrust along the line of sight for Terminal Phase Initiate.

EAGLE (garbled)  
EAGLE (garbled) you want to get another - get an update (garbled).  
EAGLE (garbled).  
EAGLE Okay, range.  
EAGLE (garbled).  
EAGLE It is.  
EAGLE The range is at 40.  
COLUMBIA Buzz, I would like to confirm that your TPI keg is 1270202, over.  
EAGLE We haven't settled on a final one yet. The last one was - standby -  
COLUMBIA (garbled).  
COLUMBIA Just as soon as you know what TPI 06 is going to be, I would appreciate a call.  
EAGLE Okay.  
COLUMBIA Last I got was - 32 seconds earlier than mine which would make it 1270202.  
COLUMBIA (garbled). Are you going to be revising that one?  
EAGLE I think probably so. How late - how late can you take a reading?  
COLUMBIA Well, to stay on my timeline, I should have it in the next couple of minutes.

END OF TAPE

EAGLE Okay. Latest estimate 127 03 39.  
COLUMBIA Thank you kindly.  
CAPCOM Eagle, Houston.  
EAGLE Roge. Go ahead.  
CAPCOM Roger. In the event of a possibility that we may have had some water channeling in those hydroxide canisters, we recommend you stay in the cabin mode from now on. Over.  
EAGLE Roger.  
CAPCOM Eagle, Houston.  
EAGLE Go ahead.  
CAPCOM Roger. I better clarify that. cut cabin mode a little bit there. What we mean is you go and stay in the cabin mode. Helmet and gloves on are your option and we really have no concern with the CO2. Over,  
EAGLE Roger. Understand.  
EAGLE Mike. You already loaded that time? We've got a final one here.  
COLUMBIA I've already loaded it. I don't think it'll make much difference.  
EAGLE Tell me - 9 seconds difference.  
EAGLE MARKS next.  
CAPCOM Columbia, Houston.  
COLUMBIA Columbia, go ahead.  
CAPCOM Roger Mike. You can go ahead and arm your logic anytime you want to and we'll give you a GO so you can hit your power alarm at your convenience.  
COLUMBIA That's a good idea babe. You see anybody watch logic.  
CAPCOM That's how it is. I'll get it from mark.  
COLUMBIA Mark Logic 1, Mark Logic 2.  
CAPCOM Columbia, Houston. One of the sec arm circuit breaker's CLOSED.  
COLUMBIA Okay. Going in touch on batteries FFE.  
CAPCOM Columbia, Houston. Logic looks good. You can arm your CYRO's at your convenience.  
COLUMBIA Thank you.  
COLUMBIA You can find your start to maneuver to CSI sir.  
EAGLE Okay.  
PAO This is Apollo Control about 6 and 1/2 minutes to ignition on the thermal phase maneuver in which the crew Eagle will thrust along the line of sight toward Columbia. Distance now between the two spacecraft

APOLLO 11 MISSION COMMENTARY 7-21-69 CDT 15:20 GET 126:48 418/2

PAO some 38.6 nautical miles closing  
at a rate of 110 feet per second.

CAPCOM All your selections looks good  
to us. Out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 126:59, CDT 15:31, 419/1

EAGLE And Mike if you want our target  
Delta-v, I'll give it to you.  
COLUMBIA Ready to copy.  
EAGLE 127 03 3082 +20 2.7 +1.7 -10.6, over.  
COLUMBIA 127 03 3082 +20 2.7 +1.7 -10.6, thank  
you.

EAGLE I'm showing a good bit of out of plane  
velocity on my cross pointers. Mike.

COLUMBIA Rog, I have no indication of it.  
COLUMBIA Coming up on 1 minute to Tig, Neil.

How's it looking?

EAGLE Pretty good.  
COLUMBIA Good.  
EAGLE That out of plane was in the AGS,

not in the radar.

COLUMBIA Roger.  
EAGLE We're burning.  
COLUMBIA That a boy.  
COLUMBIA Burn complete.  
EAGLE Read, burn complete.  
COLUMBIA Roger, thank you.  
CAPCOM Eagle, Houston, AFT omni, low bit

rate and we'll see you at 1 27 +51.

PAO This is Apollo Control. We've apparently  
had loss of signal with Columbia and Eagle as they went  
behind the moon on the 26th revolution. Next maneuver  
scheduled for about 33 minutes from now. While both  
vehicles are behind this will be the breaking series of  
maneuvers coming down to docking, or station keeping first  
and then docking at about 128 hours ground elapsed time.  
And at 127 hours 6 minutes ground elapsed time in the flight  
of Apollo-11, this is Mission Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 127:50, CDT 18:22 420/1  
(REVISED)

PAO This is Apollo Control. 127 hours  
50 minutes ground elapsed time. We're less than a minute now  
away from acquisition of the spacecraft, Columbia. Hopefully,  
we find within a few feet of it, will be Eagle. Docking should  
take place about 10 minutes from now, according to the flight  
plan. However, this is a crew option matter. We're standing  
by for word that data is coming in from the two spacecraft.  
This is lunar revolution number 27 for Columbia. We have LM AOS

SC Roger.

EAGLE Okay Mike. I'll get - try to  
get in position here, then you got it. How does the roll  
attitude look? I'll stop. Matter of fact, I can stop right  
here is you like that.

CAPCOM Eagle, Houston. Middle gimbal.  
And you might put out to Columbia, we don't have him yet.

EAGLE They're tight.

EAGLE I'm not going to do a thing, Mike.  
I'm just letting her hold in attitude hold.

COLUMBIA Okay.

EAGLE You (garbled)

COLUMBIA Okay.

EAGLE Okay, we're all yours. Roger.

COLUMBIA Okay. Okay, I have thrusters

D3 and D4 safed.

EAGLE Okay.

COLUMBIA I'm pumping up cabin pressures.

COLUMBIA That was a funny one. You know,  
I didn't feel it strike and then I thought things were pretty  
steady. I went to retract there, and that's when all hell  
broke loose. For you guys, did it appear to you to be that  
you were jerking around quite a bit during the retract cycle?

EAGLE Yeah. It seemed to happen at  
the time I put the contact thrust to it, and apparently it  
wasn't centered because somehow or other I accidentally got  
off in attitude and then the attitude hold system started  
firing.

COLUMBIA Yeah, I was sure busy there for  
a couple of seconds. Are you hearing me alright, I

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 16:37 GET 128:05 421/1

COLUMBIA Are you hearing me all right? I've got a horrible squeal.  
EAGLE Yes, I agree with that, but we hear you okay.  
COLUMBIA Houston, Apollo 11. Over.  
CAPCOM Apollo 11, Houston. Go.  
COLUMBIA Roger. I'm supposed to adjust the oxygen flow in this thing at six tenths of a pound per hour, but being as how this transducer is not working right, could you give me an updated number?  
CAPCOM Affirmative. You want to go ahead and adjust your O2 flow until it just goes off the peg, and then crank the direct O2 valve back down about 5 degrees. Over.  
COLUMBIA Boy, you were really waiting for that one, weren't you? Okay, thank you.  
COLUMBIA Houston, I did that, and I believe we are flowing oxygen but the gage is sure not staying close to your low.  
CAPCOM Roger, that's fine. That's what we expect.  
COLUMBIA Okay.  
COLUMBIA Okay, I'm going to go ahead with the tunnel leak check.  
CAPCOM Columbia, Houston. I have a new LM weight for you whenever you're ready to copy.  
COLUMBIA Not right now, Ron. Remind me of it later, would you please?  
CAPCOM Roger. We'll stand by.  
COLUMBIA Houston, Apollo 11. I let P47 run longer than I should. I may have deteriorated our state vector by that.  
CAPCOM Roger, Apollo 11. That's okay. We'll see later.  
PAO This is Apollo Control. Communications are somewhat scratchy with Apollo 11. Columbia and Eagle now reunited to become Apollo 11 again. Our best estimate on the time of docking is some 3 minutes after the premission time of 128 hours. Continuing to monitor this 27th lunar orbit for the two-way communications between the two spacecraft.  
COLUMBIA Go ahead with your DAP, please.  
CAPCOM Roger. Your LM weight, 5785. For R1 we'd like to have 61102. R2 01111. Use BD roll. Over.  
COLUMBIA Roger. I'm configured now at downlink for BD roll, and I have thrusters C4 and B3, turned off and I copy register 1, 61102 01111, and LM weight 5785. Thank you.  
CAPCOM Roger. Copy.  
COLUMBIA Houston, Columbia has completed the leak check, and proceeding with opening the hatch dump valve.

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 16:37 GET 128:05 421/2

CAPCOM Roger, Columbia. Understand you're doing the leak check. I missed anything after that.  
COLUMBIA The leak check is complete, and I'm proceeding with opening the hatch up now.  
CAPCOM Eagle - Columbia, Roger.

END OF TAPE

COLUMBIA Eagle, Columbia.  
 EAGLE Go ahead.  
 COLUMBIA My hatch is removed. You can open yours and I'll start a shaft uplink.  
 EAGLE Okay.  
 COLUMBIA Standby one first.  
 EAGLE Okay.  
 PAO This is Apollo Control still rather noisy communications here on the 27th lunar revolution. 39 minutes remaining until Apollo 11 goes behind the Moon. We'll leave the circuit up and try to monitor the conversation between the two spacecraft or between the Apollo 11 and the ground for the remainder of this pass - try to ascertain the status onboard as far as transferring the crew and other items back into the command module. The cleanup in the LM getting all the items dusted off prior to bringing them back in the command module. At 108 hours 25 minutes Ground Elapsed Time, standing by, this is Apollo Control.  
 EAGLE How are you doing.  
 COLUMBIA Yeah, everything is going fine. Be with you in just a second.  
 CAPCOM Eagle, Houston, over.  
 EAGLE Go ahead, Houston. Eagle here.  
 CAPCOM Roger. Anytime prior to jettisoning there, we'd like an AGGS the things align 400 plus 30,000, over.  
 EAGLE Okay. Any particular attitude you would like for us to get at?  
 EAGLE We're not getting any. Could you give us some coordinate gimbal angles to move the temperature and then we will align the things with the AGGS, over.  
 CAPCOM Roger, Eagle, we concur, standby on the gimbal angles and also Eagle while we got the command module directo two on there, there's a possibility that your cabin relieve - might relieve if we get up on around cabin pressure of about 5.4 or 5.5.  
 EAGLE Roger.  
 CAPCOM Eagle, Houston.  
 EAGLE Roger, go ahead.  
 CAPCOM Roger. All we are trying to do is get things and AGGS aligned together. Doesn't make any difference on the gimbal angle.  
 EAGLE Hoping you know.  
 EAGLE We are pretty close to 000. Is that all right?  
 CAPCOM Eagle, that's beautiful.  
 EAGLE You might want to take into account what will happen if we will have to maneuver to jetter censors.  
 CAPCOM Eagle, Houston. We don't care what - all we are trying to do is to get a drip later. See how long it takes to drift the part on the thing after you jettison.

EAGLE Okay, will we be jettisoning at about this attitude? That's okay. I'll align the AGGS with the things. You can tell me a little later if you need some help.  
 CAPCOM Eagle, Houston. That's fine.

COLUMBIA Houston, Columbia. You want me to realine my react angle yet?

CAPCOM Columbia, Houston. I can give you some react angles for the high gain on the LM jettison attitude. And then you can go there whenever you want to. The angles are Pitch minus 50 and yaw 0.

COLUMBIA Okay.

COLUMBIA Houston, Columbia. Say the jettison Roll, Pitch and Yaw, please.

CAPCOM Columbia, Houston. Roll 0, Pitch 025 and Yaw 0. Over.

COLUMBIA Roger. Understand Roll 0, Pitch 025, Yaw 0.

CAPCOM That's affirmative.

EAGLE Houston, Eagle. Over.

CAPCOM Eagle, Houston. Go.

COLUMBIA Roger. That appears on the red arrows is going to be much of a competitor to the leading Midas leader brands. Over.

CAPCOM There's a little noise there Buzz, say again.

CAPCOM Eagle, Houston.

EAGLE Roger. Go ahead.

CAPCOM Roger. Just a reminder to be sure to zero the AGS errors before you enable the AGS attitude HOLD there after your get in BURN attitude.

EAGLE Roger. You mean SEP attitude?

COLUMBIA Houston, how do you read Columbia high gain now?

CAPCOM Hey Columbia, Houston. Mighty fine. Loud and clear.

COLUMBIA I read the same thing.

CAPCOM And Eagle, Houston. Your steerable antenna angles for jettison attitude are. Over.

EAGLE Roger. Go ahead.

CAPCOM Roger. Pitch 165, Yaw 68. Over

EAGLE Roger. Pitch 165, Yaw 68.

CAPCOM Eagle, Houston. Correct.

CAPCOM Columbia, Houston.

COLUMBIA Columbia, go ahead.

CAPCOM Roger Mike. You want to trig the 02 flow up, just a bit there?

COLUMBIA Okay. Coming up.

COLUMBIA Houston. Do you have any preferences as to what you want us to do with the probe. Over.

CAPCOM Columbia, Houston. Stand by 1.

COLUMBIA Okay. Eagle says they've got a place for it inside there, so no problem.

CAPCOM Roger. That's all we were interested in.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 128:46, CDT 17:18, 424/1

CAPCOM Eagle, Houston.  
EAGLE Eagle, go ahead.  
CAPCOM Roger, Neil it looks like your steerable's  
good. You can compute your cockmode to slough and, the high  
bit rate please, over.  
EAGLE Cockmode to slough and high bit  
rate.  
COLUMBIA Okay stand by just one please.  
COLUMBIA Okay shoot them on down.  
CAPCOM Eagle, Houston.  
EAGLE Go ahead, Houston.  
CAPCOM Roger, Neil, just a reminder again,  
the ACA out of detent to zero the AGS out of there just in  
case you go to attitude hold, shortly.  
EAGLE Okay.  
COLUMBIA You say you wanted the probe now.  
CAPCOM Eagle, Houston.  
EAGLE Houston, Eagle go ahead.  
CAPCOM Roger, that ACA out of detent didn't  
quite do it because the mode control switches were off.  
Request guidance control to PNGCS and then back to AGS, and that  
will zero the AGS there, over.  
EAGLE Say again please.  
CAPCOM Roger, request guidance control switch  
to PNGCS and then back to AGS, over.  
EAGLE Okay, we still have both control  
switches off, over.  
CAPCOM That's okay, that's good.  
EAGLE And I thought I'd just take about 5  
seconds here and see if I could get 000 gone, since we're  
fairly close to gimball ON right now.  
CAPCOM Eagle, Houston, that's fine.

END OF TAPE

PAO This is Apollo Control. Some 6 minutes 40 seconds remaining until Apollo 11 goes behind the moon on the 27th revolution. The signal from the passive seismometer, which was left on the moon by the crew of Eagle, was lost for 30 minutes beginning about 5 minutes before Eagle took off this morning. The signal was lost because of a equipment problem that the Canary Island tracking station. The Seismic equipment is back on line now, and is beginning to record lunar day surface temperatures. The dust detector recorded zero dust after Eagle lift off. The laser ground station have not yet acquired a return signal from the Laser Ranging Retro Reflector. Five minutes away from loss of signal with Apollo 11. We will continue to monitor the air-to-ground as the spacecraft goes over the hill. The crew now is engaged in the decontamination procedures inside the lunar module prior to transferring back into the command module.

CAPCOM about 5 minutes to LOS. Your LM jet time will be 131 plus 52 and I have the rest of the maneuver pad if you want it now, or I can give it to you on the next time around.

COLUMBIA Stand by 1.

COLUMBIA Could you read around the next time around, please.

CAPCOM Sure. That's fine. We'll give it to you then.

CAPCOM Apollo 11, Houston. About a minute and a half to LOS. You're looking great. It's been a mighty fine day.

COLUMBIA Boy, you're not kidding.

PAO This is Apollo Control. We've had loss of signal as Apollo 11 went around the back side of the moon on the 27th rev. We'll have acquisition with Apollo 11 approximately 45 minutes from now. At - Let's see - Would you believe they don't have the next tables up for the next rev. At any rate, 45 minutes from now, and at 129 hours 4 minutes ground elapsed time, this is Apollo Control.

END OF TAPE



PAO This is Apollo Control at 130 hours 16 minutes. We reacquired Apollo 11 about 25 minutes ago, at 129 51. At that time Mike Collins reported that all 3 crewmen were in the command module. The transfer occurring while the spacecraft were on the back side of the moon. They had closed out the LM early and had transferred to the second coolant loop. That decision was made in mission control because the secondary loop was on, the primary loop disabled in the close out process. We did not want to have the LM docked to the CSM for an undue length of time, because the primary guidance system is not cooled. The decision was initially made to jettison the LM at 130 hours 30 minutes, however the crew continued ahead of schedule. They were ready to jettison ahead of that time, and Collins reported at 130 10 about, 17 minutes ago, that they were, had jettisoned the LM and said it had departed at several feet per second, and we heard a comment from Buzz Aldrin, that he noticed some cracks in the thermo covering around the LM tunnel, docking area, however he said it did not appear to be a structural crack but merely some cracks in the thermal covering. We are currently scheduled to perform the small reaction control system maneuver with the command and service module for separation from the LM at 130 hours 30 minutes, or about 12 minutes from now. We'll pick up this pass as it began on tape and when we've caught up, we'll continue to follow the activity live.

CAPCOM Hello Eagle, Houston... Do you read, over.

COLUMBIA Houston, this is Columbia, reading you loud and clear. We're all three back inside, the hatch is installed. We're running a pressure check leak check. Everything's going well.

CAPCOM Roger, Eagle, correction, roger Columbia, we copy. You guys are speedy. You beat us to the punch. We had a couple of things for you.

COLUMBIA What are they.

CAPCOM Oh it was just, we wanted you to close the CO2 sensor breaker and give us an RCS on board read out out of Eagle, but that's all.

CAPCOM Columbia, Houston. We've got a state vector for you. If you give us P00 and accept, over.

COLUMBIA Buzz says the CO2 sensor circuit breaker is in.

CAPCOM Rog, thank you very much.

COLUMBIA The RCS quantity was approximately 68at A and 45 percent at B.

CAPCOM Roger.

COLUMBIA And we're going P00 and accept.

CAPCOM Roger, thank you.

CAPCOM Columbia, Houston, your friendly white team's going to be on till we get you on the way home and we'd like to congratulate everybody on a successful rendezvous and a beautiful EVA. It was a great show for everybody, over.

COLUMBIA Thank you Sir, I'll tell Neil and Buzz. Houston, the hatch pad was a negative check. I'm going to go to LM tunnel again now and leave it there.

CAPCOM Roger, Columbia, we copy, that's good and we'd like a readout on the TEP of about the time you, that Eagle selected the secondary loop, over.

COLUMBIA Stand by.

CAPCOM Hello, Columbia, Houston, we got the load in. You can do the verb 66 and the computer is yours, over.

COLUMBIA Roger.

COLUMBIA Houston, Apollo 11, I'd say that the secondary loop was situated about 15 to 20 minutes ago.

CAPCOM Roger, copy, Columbia, thank you very much.

CAPCOM Columbia, Houston, it looks like you guys are so speedy on us that we're thinking about moving up jettison time to about a GET of 130 +30 if that's okay with you all, over.

COLUMBIA That's fine. I've still got to get a P30 pad from you.

CAPCOM Rog, we want to talk to you about that. Mike, we can, for your druthers, we can do it either way. We can either let you do it in the jettison in P30, correction P47 or we can send you a P30 target load up and then you - let you call P41, which ever you want to do, over.

COLUMBIA Yea, I see Ron was going to give me a P30 pad and the flight plan says P47. Out of the two, I prefer to go to P30, P41 route.

CAPCOM Rog, beautiful. We've got the load if you'll give us POO and ACCEPT, we'll send you a load up, stand by. Columbia, Houston, we'd like you to terminate direct O2 flow and stand by on your POO and ACCEPT. We'll have to generate a new load due to the move up on time, over.

COLUMBIA Roger.

CAPCOM Columbia, Houston, over.

COLUMBIA Roger, Mike. It looks like if we move up this jettison time and give you a new load it would require a new attitude, and we can't do that due to the LM already closed out and it would fight us all the way around and we'd loose comm with it. We're thinking separating at

CAPCOM P47 in about 10 minutes. We're looking at trajectory and we'll be with you momentarily, over.

COLUMBIA Okay, it's no big thing with me either way.

CAPCOM Rog.

CAPCOM Hello Columbia, Houston. We'd like you to start down your jettison check list. We recommend picking up page F11-12 and we'd like to jettison in 10 minutes. That'll be 130 1445, over.

COLUMBIA Okay.

CAPCOM Columbia, Houston, if that's not satisfactory, let us know, over.

COLUMBIA Houston, Columbia how about a go for logic buss arm.

CAPCOM Stand by.

CAPCOM Columbia, Houston you've got a go.

COLUMBIA Thank you.

CAPCOM Columbia, Houston. You can undock at your convenience, correction, jettison at your convenience. We would like you to jettison Eagle and station keep, in P47 and station keep and we'll have another attitude and a maneuver for you so we'll be okay for TEI, over.

COLUMBIA Roger that. And I'm standing by to go to P47 just as soon as you give me a go for pyro arm.

CAPCOM Rog, I thought we gave you that.

Mike you're go for pyro arm and your go for jettison.

COLUMBIA Okay. Okay let her go in 2 seconds.

CAPCOM Copy, out.

COLUMBIA 983 reading -4ball -3ball3, or correction - both register 1 and register 2 are reading -4ball 3, register 3 is zeros, the EMS remained on 100.0. A fairly loud noise and it appears to be departing, oh I would guess several feet per second.

CAPCOM Roger, can you kindof station keep with it, Mike? Just stand by now.

COLUMBIA Will do.

CAPCOM Columbia, Houston, don't try to chase it, just hold what you've got.

COLUMBIA Charlie, did it hold cabin pressure this time.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 18:48 GET 130:26 428/1

CAPCOM Columbia, Houston. Don't try to chase it, just hold what you got.

COLUMBIA Dilate at all cap pressure this time.

CAPCOM Say again, Buzz. Over.

COLUMBIA Okay, I thrust it back - I thrust it back toward it a little bit, Charlie, and I'm now reading Noun 83 plus 4 balls 4 minus 4 balls 8 and you want me to fuel average D. Right?

CAPCOM Stand by. That's affirmative. You can exit P47.

COLUMBIA There she goes. It was a good one.

CAPCOM Roger, got you. We got Eagle looking good. It's holding cabin pressure and you picked up about 2 feet per second from that jettison.

COLUMBIA I believe that. I can see some cracks on the outer - stroking around the tunnel. Except the tunnel's protective covering - I don't think it has anything to do with suction.

CAPCOM Roger.

CAPCOM Hello, Columbia, Houston. We'll have an attitude and a little tweak burn for you in about 13030 so we can separate from Eagle. Over.

COLUMBIA That's fine.

CAPCOM Columbia, Houston. Would you start a maneuver to a pitch of 230 for this little tweak burn? Over.

COLUMBIA Roger. Pitch 230.

CAPCOM Roger, Mike, and verify track mode in AUTO for the high gain.

COLUMBIA We're in REACQ. Is that all right?

CAPCOM Say again.

CAPCOM We need AUTO.

COLUMBIA Say again. We're in REACQ - AUTO REACQ.

CAPCOM Roger. We need AUTO, please, sir.

COLUMBIA There you got it.

COLUMBIA Roll 0, pitch 320. Yaw 0?

CAPCOM Right now that's what we're looking at.

Stand by. We might have you roll so we can keep the high gain. Stand by.

COLUMBIA Roger.

CAPCOM Columbia, Houston. Over.

COLUMBIA Go ahead.

CAPCOM Roger, Mike -

COLUMBIA Apollo 11, these days.

CAPCOM Oh, Roger, Apollo 11. We got you going to a posigrade attitude and we want you this burn on B - even minus X thrusters at about 2 or 3 feet per second and we got a load for you and we'll set it up momentarily. Over.

SC Okay.

CAPCOM Apollo 11, Houston. Would you give us to

L  
APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 18:48 GET 130:26 428/2

CAPCOM an ACCEPT? We have a load for you. Over.  
SC You got it.  
CAPCOM Roger, Mike. And our pitch attitude's  
a little long here. If you're ready to copy, I'll give you  
the SEP pad. Over.  
SC Go ahead. Ready to copy.  
CAPCOM Roger. Starting with Noun 33, 130300000  
plus 00020 plus all zeros plus all zeros. Roll, all zeros,  
pitch 230, yaw zero. Noun 44 is NA. Delta-VP, 00020. Burn  
time, 007. Delta-VC, 00020. We have - the rest of the pad  
is NA.  
SC Roger. GET 130 hours 30 minutes. Delta-VX,  
2.0, roll 0, pitch 230, yaw 0, Delta-VC, 2.0.  
CAPCOM That's affirmative, Apollo 11. And, Mike,  
it's similar to the SEP burn prior to that last undocking here.  
And the P41 you should see on register 1 - 2, and then you  
confirmed minus XC. Read 4. Over.  
CAPCOM Apollo 11, Houston. Computer's yours. Over.  
SC Roger, Charlie. We switched our OMNI-B  
DELTA, and I lost that last transmission. Would you say it again,  
please? The thing I'm wondering about specifically is that  
earlier you said it would be minus X-thrusters and the fan  
indicates plus X. Do you want me to no that to zero or do you  
want half two and leave it as a fourth?  
CAPCOM Roger, Apollo 11. The way we gave it to  
you in the attitude we're in. It'll be just like the SEP burn  
that you had yesterday. You'll PVL Noun 85 will give you a  
plus 2 and then you just burn minus X until you read 4. Over.  
SC Understand.  
CAPCOM Apollo 11, Houston. We see you in P41 now.  
It might take you a couple of minutes to integrate these vectors  
that we gave you and if you don't make TIG, it's pretty  
insistent if you can just let P41 bring you up to TIG, and  
when you get to zero, you can burn on that. Over.  
SC Okay. Burns complete residuals  
plus 3 balls 40 plus 4 balls 7 plus 4 balls 2, Delta-V counter  
102.1. Over.  
CAPCOM Copy, Apollo 11. Looks good to us. Over.  
SC Okay.  
SC Houston, Apollo 11. How about coming up  
with a good communications attitude for us to go to between  
now and the time we've maneuvered at TEI attitude.  
CAPCOM Roger. Sir stand by  
CAPCOM Hello, Apollo 11, Houston. A couple of  
things for you. Over.  
SC Go ahead.  
CAPCOM Okay, Mike, you can maneuver to your  
preliminary TEI attitude as shown on page 398 of the flight  
plan, and the high gain angles are good as shown in the flight

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 18:48 GET 130:26 428/3

CAPCOM plan, and we'd like you to dump the waste  
water at 131:05 down to 10 percent. Over.  
SC Okay; understand. I'm going to go to  
roll, 1.1, pitch, 52.6, and yaw, 13.8, and you want a waste  
water dump 10 percent starting at 131:05.  
CAPCOM That's affirmative. Right out the LOS.

END OF TAPE

CAPCOM That's affirmative. Right out  
to LOS.

COLUMBIA We're now losing progress, Houston.  
CAPCOM Copy, 11. Out.  
CAPCOM Apollo 11, Houston. Over.  
PAO This is Apollo Control at  
130 hours 46 minutes. That command module separation maneuver,  
which occurred at 130 hours 30 minutes, was a 2 foot per  
second retrograde burn. Burn duration was 7 seconds. The  
Flight Dynamics Officer reports that at transearth injection,  
which is scheduled to occur as per the flight plan, at about  
135 hours 25 minutes, and at that time, the CSM will be about  
20 miles ahead of the LM and about 1 mile below.

COLUMBIA Apollo 11 under high gain. How  
do you read?  
CAPCOM 5 by, 11. How me? Over.  
COLUMBIA You're loud and clear, Charlie.  
What numbers are you looking at for TEI Tig preliminary.  
135 hours 23 minutes. Something like that?  
CAPCOM That's affirmative, Mike. We're  
looking at about nominal time. We've considered kicking it  
up a rev, but we don't think this rev track is going to be  
any good since we had the RCS burn and we need some more  
tracking to get you a good TEI. Over.  
COLUMBIA That's what we're looking for.  
CAPCOM Roger.  
CAPCOM 11, Houston. Looks like it's  
going to be pretty relaxed time here for the next couple of  
hours. We'll have you a pad, of course, the next rev or so  
and we'll keep you posted on TEI. Looks like nominal time.  
Over.  
COLUMBIA Thank you.  
CAPCOM And your little maneuver back  
here a moment ago, will put you about 20 miles ahead of the  
LM at TEI.  
COLUMBIA Okay.  
COLUMBIA Imagine that place has cleared  
out a little bit after that rendezvous. You can find a place  
to sit down almost. Huh?  
CAPCOM Rog. Our MOCR's about empty  
right now. We're taking it a little easy. How does it feel  
up there to have some company?  
COLUMBIA Damn good. I'll tell you.  
CAPCOM I'll bet. I think you'd almost  
be talking to yourself up there after 10 revs or so.  
COLUMBIA No, no. It's a happy home here.  
It'd be nice to have company. As a matter of fact, I'd be  
nice to have a couple of hundred million Americans up here.

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 130:36, CDT 18:58 429/2

CAPCOM Roger. Well, they were with you in spirit.  
COLUMBIA Let them see what they're getting for their money.  
CAPCOM Rog. Well, they were with you in spirit anyway. At least that many. We heard on the news today, 11, that last night - yesterday when you made your landing, New York Times came out with a - headlines, the largest headlines they've ever used in the history of the newspaper.  
COLUMBIA Copied. I'm glad to hear it was fit to print.  
CAPCOM It was great.  
CAPCOM That's why we didn't read you up any newscast. There really wasn't anything to talk about.  
COLUMBIA Hi there Buzz..

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 130:51, CDT 19:23 430/1

CAPCOM Apollo 11 Houston. We've got 10 minutes to LOS, see you over the hill at 131:48, over.  
SC Okay, Charlie, I'll dump the water as soon as we go around the moon.  
CAPCOM Everything's looking real good now.  
SC Yea, same here.  
CAPCOM Hello Apollo 11, Houston. Coming up about 4:30 LOS. You're looking great on all your systems. Eagle purring right along. After an hour 30 without any cooling, the PNGCS is still looking good, over.  
SC Roger.  
CAPCOM Apollo 11, Houston, will you verify that your rendezvous radar transponder is off, over.  
SC It's not but I'll get it off.  
CAPCOM Rog, we were seeing, believe it or not, we were seeing some funnies on the Eagles rendezvous radar and that was the only theory that we had. It looked like it was a good one.  
SC Good theory.  
PAO This is Apollo Control. We've had loss of signal now. At the present time we show Apollo 11 in an orbit with a high point of 62.6 nautical miles and a low point or pericenthan of 54.9. The spacecraft is traveling at a speed of 5 thousand 3 hundred 55 feet per second. We will reacquire the spacecraft in a little over 45 minutes on the 21st revolution. At 131 hours 3 minutes this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control at 131 hours 48 minutes. We're standing by to reacquire Apollo - Apollo 11. Acquisition should come in about 5 seconds. This revolution should be relatively quiet. We don't have a great deal of activity scheduled. The crew may have time to get something to eat, and here on the ground we will be computing the information needed for their transearth injection burn. We do have data now from the spacecraft. We'll standby for a call to the crew.

CAPCOM Hello, Apollo 11, Houston. We are standing by. Everything is looking great here, over.

SC 11. Roger.

PAO This is Apollo Control. We suspect the crew is having something to eat at this time which probably accounts for the relatively quiet period. One of the things that we are watching with interest here in Mission Control is the lunar module. At the time Aldrin and Armstrong left the LM and came back into the service module, they switched over to the secondary cooling loop as part of a test that we are running to determine just how long the primary guidance and navigation system will last without cooling. The primary guidance system is not cooled on the secondary loop which provides backup cooling for the secondary guidance system and it has always been a point of interest as to just how long the primary guidance system will survive without cooling - estimates range up to several hours. The LM TEL COMM Controller reports that at this time we are seeing some rise in the PIPAS. These are the Pulse Integrating Pendulum - Pendulous Accelerometers which - the primary guidance system uses to detect changes in motion and attitude and of course they are an essential item in the - the primary guidance system. We are seeing a gradual rise in temperature but the TEL COMM engineer reports that the primary guidance system still looks very good. At the time the crew reported they were back that Armstrong and Aldrin reported that they were back in the command module, we asked them what time they did switch over to the secondary loop. Armstrong estimated that that occurred about 129 hours 40 minutes which was a little over 2 hours ago. We will continue to monitor the LM and to observe the performance of the primary guidance system. All systems on the command service module continue to function very well at this time and the same can be said for the lunar module. At the present time we show Apollo 11 in a orbit 62.5 nautical miles by 54.2. The spacecraft travelling at a speed of 5349 feet per second.

END OF TAPE



CAPCOM Pat said simply, "It was fantastically marvelous." Buzz' Joan said, "Apparently couldn't quite believe the EVA on the moon. She said, "It was hard to think it was real until the men actually moved. After the moon touchdown, I wept because I was so happy." But she added, "The best part of the mission will be the splashdown." In other news, and there was a little bit, another explorer Thor Heyerdahl had to give up his attempt to sail a papyrus boat across the Atlantic. The storm-damaged boat was abandoned about 650 miles from Bermuda. The speed of the craft had been reduced to about 25 miles a day and Heyerdahl said the object of the voyage had not been to provide an endurance test for the crew. Looking at the world of sports, let's see here. While you were busy the other day, Joe Namath and Football Commissioner Pete Rozelle made the announcement that Broadway Joe had agreed to sell his interest in the Bachelors III restaurant and report to the New York Jets. Joe arrived at the Jet's training camp today and had his first workout. Several other Jet players who had held out along with Joe also reported. And Davy Hill, from Jackson, Michigan, won his third major golf in as many starts in the past week. He won the Philadelphia Classic. Hill has won four tournaments so far this year and is the leading money winner this year with a cool \$129 000. And in baseball, the west division of the National League remains a tight race. LA and San Francisco are one game behind league-leading Atlanta. The Astros have a record of 48 wins and 48 losses and are now in fifth place, seven games out. A twinbill between the Astros and Cincinnati last night was postponed because of rain. The Chicago Cubs are still in first place in the East Division. They lead the New York Mets by 4 and 1/2 games. And in the American League, Baltimore is breezing toward the Eastern Division title. They lead second place Boston by 11 games. Looking ahead, the All-Star baseball game is scheduled for tomorrow. And President Nixon was scheduled to see the game and then leave immediately after the game for the Pacific splashdown area, before going on his tour of Europe. And that about covers the news this day. You guys have been making most of it and I'm sure we couldn't fill you in on any of the details that you already know. Out.

SC

Thank you much, Charlie.

CAPCOM

Your welcome.

CAPCOM

11, Houston. We've got a preliminary PEI 30 pad if you're ready to copy?

APOLLO 11 MISSION COMMENTARY 7-21-69 CDT 20:31 PM GET 131:59 432/3

SC Ready to copy.  
CAPCOM Roger. Coming at you. TEI 30  
SPS G&N 36691 minus 061 plus 067 135 23 41 49. NOUN 81  
plus 32020 plus 06713 minus 02773 181 054 013. NOUN 44  
HA is NA plus 00230 32833 228 DELTA-VC 32625 24 1510 355.  
Next 3 lines are NA. NOUN 61 plus 1103 minus minus

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 20:56 GET 132:24 433/1

CAPCOM plus 1103 minus minus 17237 11806 36275  
1950452. You set stars - or Deneb and Vega, 242172012. We  
like 2 jet ullage to 16 seconds. The horizon will be on the  
11 degree mark at TIGN minus 2 minutes. And the other comments,  
your sextant star is visible after GET of 134:50. Ready for  
your readback. Over.

SC Roger. We have a TEI 30 SDS G&N 36691  
minus 061 plus 067 135234149 plus 32020 plus 06713 minus  
02773 181 054 013 NA plus 00230 plus 32833 228 32625 241510  
355 NA 3 times plus 1103 minus 17237 11806 36275 1950452  
Deneb and Vega 242172012 2 jet ullage 16 seconds. Horizon  
11 degree line at TIGN minus 2 minutes. Sextant star visible  
after 134:50. Over.

CAPCOM Roger, Mike. Good readback. Out.  
PAO This is Apollo Control at 132 hours, 29  
minutes. That last string of numbers read up to the spacecraft  
included the information the crew will need to start them on  
their way back to Earth in about 2 hours, 54 minutes. The  
time of ignition for the transearth injection burn again is  
135 hours, 23 minutes, 42 seconds. They will burn their  
20 500 pound thrust service propulsion system engine for 2  
minutes, 28 seconds and increasing their speed by 3283 feet  
per second. And our preliminary estimate is that that will  
put them into the Pacific Ocean at the primary landing site  
at 195 hours, 18 minutes, 47 seconds, ground elapsed time,  
or almost precisely on the flight plan. The spacecraft weight  
at the time they do the transearth injection burn will be  
36 691 pounds. We'll continue to stand by for any communication  
from the spacecraft. We now have about 29 minutes, 30 seconds  
until the Apollo 11 goes around the corner and behind the moon  
out of radio contact.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 132:39, CDT 21:11 434/1

CAPCOM Hello Apollo 11, Houston.  
7 minutes to LOS. Next AOS 133:46. You're looking good  
going over the hill. Out.

PAO This is Apollo Control. We're  
now about 30 seconds from loss of signal with Apollo 11 on  
the 29th revolution. We'll be reacquiring in about 46 minutes.  
As the spacecraft comes around on its 30th revolution, that  
will be the next to the last full revolution in lunar orbit.  
The transearth injection maneuver will be performed at the  
end of the 30th revolution, just after - actually, just after  
beginning the 31st revolution of the moon. Apollo 11 is now  
in an orbit with a high point of 62.6 nautical miles and a  
low point of 54.2. The current spacecraft velocity is 5,356  
feet per second, and we show an orbital weight of 36,691 pounds.  
We have loss of signal now. We'll be coming back up when we  
reacquire in about 45 minutes. At 133 hours, this is Apollo  
Control, Houston.

END. OF TAPE

PAO This is Apollo Control at 133 hours 45 minutes. We're now 50 seconds from reacquiring Apollo 11 on the 30th revolution of the moon. This will be our last front side pass before transearth injection. On this revolution we'll be passing up to the crew the final computations for their transearth injection maneuver, which is scheduled to occur at 135 hours 23 minutes 42 seconds, or about 1 hour 38 minutes from now. We should have acquisition of signal now in about 10 seconds. We'll stand by.

PAO We have acquired the signal from the spacecraft now. We're standing by at this time for a call from the crew or for Capcom Charlie Duke to put in a call to the crew from the ground. We presently show the lunar module in an orbit 63.3 by 56 nautical miles, the command service module is in an orbit 63.2 by 53.9. At the time of the transearth injection burn we expect that the command module will be about 1 mile below the LM and about 20 miles in front of it.

CAPCOM Hello Apollo 11, Houston. We're standing by.

SC Roger.

CAPCOM We'd like you, sometime at your convenience, to stir up the cryos on this pass and we're wondering if you got the fuel cell purge, over.

SC Roger the O2 fuel cell purge.

CAPCOM Say again, you're breaking up.

SC Roger, the O2 fuel cell purge is complete.

CAPCOM Rog, copy.

CAPCOM Hello Apollo 11, Houston. We've got a load for you if you give us POO and ACCEPT. The load consist of a CSM pre PEI state vector, it's going in the CSM slot and a post TEI state vector that'll go into the LM slot, if that's okay, and also a TEI target load, any comments, over.

SC Very good, thank you very much.

CAPCOM Yes sir.

SC POO and ACCEPT, you got it.

CAPCOM Thank you.

CAPCOM And 11 Houston, a reminder, you can scratch the verb 66 at 134 30.

SC Understand.

CAPCOM And 11, Houston for your information, Eagle, we had an ISS fail light came on at about 3 19 due to a CDU over heating and at about this time at AOS it looks like we're about to loose the platform.

SC Roger.

END OF TAPE

PAO This is Apollo Control. At this time the crew should be involved in their pre-ransearch injection status checks. They will also be aligning the platform on their spacecraft guidance system and will be passing up the final information for the transearch injection burn computed on the ground. A few minutes ago you heard Charlie Duke advise the crew that we show the LM platform is about to go. We've mentioned that prior to leaving the lunar module the crew had deactivated the primary cooling loop placing the secondary cooling loop in operation aboard the LM. This means that the primary guidance system does not get cooling. This is part of a preplanned test to find out just how long the primary guidance system would continue to function without cooling. We had predicted in advance that it would - may not - possibly not last much longer than a hour or so, but at the time Charlie Duke reported the platform had just gone down on the LM, it had been in operation without cooling a little more than four hours. We had an approximate time from the crew of transferring to the secondary cooling loop of about 129 hours 40 minutes and we got the report from Duke that the LM guidance platform was no longer usable at 133 hours 55 minutes. We'll continue to standby for any further conversation from the crew. We're now one hour twenty minutes ten seconds away from transearch injection which will occur on the backside of the Moon at the beginning of the thirty-first revolution.

CAPCOM Apollo 11, Houston. We got the load in. You can have your computer.  
SC 11. Are you through with the computer?  
CAPCOM That's affirmative Buzz.  
SC All right. That's timing for you.  
CAPCOM Apollo 11, Houston. Your friendly

white team has your coming home information if you are ready to copy, over.

SC Standby.  
SC All right, ready to copy.  
CAPCOM Rog, 11. Got to pads for you. TEI 30 and then a TEI 31. TEI 30 SPS G & N 36 691 minus 061 plus 066 135 23 41 56 NOUN 81 32 correction plus 32 0 11 plus 06 818 minus 02 650 181 054 014. Apogee is NA. Perigee plus 00 230 32 86 correction 32 836. Burntime 2 28 32 628 24 151 1 35 7. Next three lines are NA. NOUN 61 plus 11 03 minus 17 237 11 806 36 275 195 04 52. Set stars are Deneb and Vega 242 172 012. We'd like ullage of two jets per 16 seconds and the horizon is on the 10 degree line at TIG minus 2 minutes and your sextant star is visible after 134 plus 50. Standby on your readback. I have a TEI 31 if you are ready to copy, over.

SC Roger, TEI 30 SPS G & N 36 691 minus 061 plus 066 135 23 41 56 plus 32 0 11 plus 06 818 minus 02 650 181 054 014. Apogee is NA plus 00 230 -

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69 CDT 22:38 GET 134:05 437/1

SC Yaw 14, up 10 A, plus 00230 32836 228  
32628 41511 357, NA plus 1103 minus 17237 11806, 86275, 1950452  
Deneb and Vega 4217201, 3 jet ullage, seconds, horizon out  
of the window 10 degrees TIG minus 2 minutes. Sextant star  
at 134:50. Over.

CAPCOM Roger, Buzz. Good readback. You're very  
weak. If you're ready to copy, I've got a TEI 31 for you.  
Over.

SC Alright. Go ahead.

CAPCOM Apollo 11, Houston. You were cut out.  
Say again.

SC Roger. Stand by one.

CAPCOM Roger.

SC Alright. Go ahead. I'm ready to copy.

CAPCOM Roger, 11. TEI 31, SPS G&N 36691 minus  
061 plus 066 137 223985 plus 32838 plus 06845 minus 02487 NA  
pitch 052, the rest of the pad is NA. Ready for your readback.  
Over.

SC Roger. TEI 31, SPS G&N 36691 minus 061  
plus 066 137 223985 plus 32838 plus 06845 minus 02487 NA pitch  
052, the rest is NA. Over.

CAPCOM Roger. Good readback. And Buzz, did you  
say sextant star is visible after 134:50?

SC No, I wrote down 134:10. I wasn't real  
sure about that one.

CAPCOM Roger. It went by me there. Retro caught  
it. It's 134:50. Over.

SC Okay. 134:50. Thank you.

CAPCOM Yes, sir.

PAO This is Apollo Control at 134 hours, 10  
minutes. We have about 47 minutes, 30 seconds before losing  
contact with Apollo 11 as it goes behind the moon in preparation  
for the transearth injection burn. With the burn we would  
reacquire the spacecraft at 135 hours, 34 minutes, 11 seconds.  
Without the transearth injection burn on the upcoming revolution  
we would reacquire at 135 hours, 43 minutes, 50 seconds. The  
final figures on that burn as passed up to the crew a few  
minutes ago are as follows: ignition will occur at 135 hours,  
23 minutes, 42 seconds. The burn duration will be 2 minutes,  
28 seconds. That will add 3284 feet per second to the space-  
craft velocity starting it on its path back to Earth. And we  
would consume about 10 000 pounds of propellant with  
that burn. Splash would occur according to our preliminary  
figures, just about precisely as predicted in the flight plan.  
We'll continue to monitor now for any further conversation  
from the spacecraft.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/21/69, GET 134:15, CDT 22:48, 438/1

CAPCOM Hello Apollo 11, Houston, after the  
burn we'd like you to trim X&Z, over.

SC Okay, Charlie.

CAPCOM Rog, and that's 2 tenths of a foot  
per second, as shown in the flight plan.

CAPCOM Sounds like there's a story behind  
that one, too.

SC We'll tell you when you get back.

CAPCOM Hello Apollo 11, Houston will you  
verify that you've still got the cryos, over.

SC Roger, we've still got them.

CAPCOM Thank you sir.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 134:25 CDT 22:58 439/1

PAO This is Apollo control at 134  
hours, 32 minutes. Flight director Gene Kranz just requested  
his flight controllers to view all of their data, take a  
good look at the spacecraft, and be prepared to make go, no  
go recommendations shortly for the transearth injection burn.  
That maneuver now 51 minutes, 27 seconds away. All systems  
on the spacecraft looking good at this point. The cabin  
temperature has been running about 72 degrees. At this time,  
the crew is aligning the platform on their guidance system.  
The stable platform used as a attitude reference for the  
upcoming burn. We've had very little conversation both here  
in the control center and from the spacecraft on this pass.  
We'll continue to stand by and monitor.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/21/69, GET 134:35, CDT 23:08 440/1

CAPCOM Apollo 11, Houston. You are go for TEI.  
Over.

SC Apollo 11, thank you.

END OF TAPE

PAO This is Apollo Control at 134 hours 48 minutes. It continues very quiet out here in mission control. The flight controllers have been observing the crew inputs through their computer and monitoring as the crew prepares for the trans earth injection burn, scheduled to occur in about 35 minutes from now. We have now 9 minutes 20 seconds until loss of signal. The spacecraft currently traveling at a speed of 5,329 feet per second and the altitude is 62.5 nautical miles. At the time of the trans earth injection burn, the lunar module, Eagle, should be about 20 miles behind the command module.

CAPCOM Hello Apollo 11. Houston. You've got about 8 minutes till LOS your AOS with the burn 135:34:05. No burn 135:44. Over.

COLLINS Okay, thank you.

PAO The crew has a go for the trans earth injection at the beginning of the 31 revolution. All systems on the spacecraft are looking very good at this point. You heard Capcom Charlie Duke advise Mike Collins that we will reacquire the spacecraft on the other side of the moon. Now with the burn the ground elapsed time of 135 hours 34 minutes and 5 seconds. Without the burn we reacquire at 135 hours 44 minutes 3 seconds. We now have 6 minutes 50 seconds until loss of signal. We will continue to monitor.

CAPCOM Apollo 11. Houston. One minute to LOS. Go sic'em.

COLLINS Thank you sir. We'll do it.

PAO Thirty seconds now until loss of signal. We've had a last status check from the flight director and all around the room the word is go. We're now 26 minutes 23 seconds from the trans earth injection maneuver - 20 seconds until loss of signal.

PAO And we have loss of signal now. We should next reacquire Apollo 11 at 135 hours 34 minutes 5 seconds. We are now 25 minutes 38 seconds from trans earth injection.

END OF TAPE

(Dead Air)

END OF TAPE

PAO This is Apollo Control. We're now less than 30 seconds from the time in which trans-Earth injection is scheduled, the burn to start Apollo 11 on its trajectory back to Earth. We're now 15 seconds from the scheduled ignition time. That burn will last about 2 minutes 28 seconds and consume 10 000 pounds of propellant. The crew should be burning at this time. Of course, that maneuver is performed on the back side of the moon. We have no data from the spacecraft here in Mission Control at this time. We won't know how the burn went for about another ten minutes, which is the time of which we're scheduled to reacquire Apollo 11. During the course of this burn the spacecraft will increase its speed by about 3280 feet per second, or about 2240 miles per hour.

HOUSTON Track Houston contact now on.

HONEYSUCKLE Honeysuckle.

GUAM Guam.

HOUSTON Roger. Stand by for a (garble) check.

Houston contact checking. 1 - 2 - 3 - 4 - 5 - 5 - 4 - 3 - 2 - 1.  
1,2,3,4,5,5,4,3,2,1. Test out.

HONEYSUCKLE Houston contact, Honeysuckle (garble).

HOUSTON Go ahead.

HONEYSUCKLE I'm going to put that on (garble).

HOUSTON Roger.

GUAM This is Guam contact. 100 per cent . . .  
good modulation. How would you like the (garble) to  
figure.

HOUSTON Honeysuckle and Guam, we will have a  
(garble) in the CSM downlink.

HONEYSUCKLE Honeysuckle (garble).

GUAM Guam roger.

HOUSTON Honeysuckle and Guam, this is Houston  
contact. (Garble).

HONEYSUCKLE Honeysuckle, roger.

GUAM Guam, roger.

PAO Trans-Earth injection should be completed  
in about 10 seconds from now. And we should have shut-down  
at this time. At this point Apollo 11 should be traveling  
at a speed of about 8660 feet per second, or about 5900 miles  
per hour. It should be on its way back to Earth, headed for  
Splashdown in the Pacific Ocean at 195 hours 18 minutes.  
With a successful burn we should reacquire Apollo 11 in  
7 minutes 20 seconds from now.

END OF TAPE

PAO This is Apollo Control. We're now less than 1 minute from reacquiring Apollo 11. When last we heard from the spacecraft all systems were looking very good and we were in very good shape for the transearth injection maneuver. At this point Apollo 11 should be about 10,000 pounds lighter and on its way back to Earth. We're now 32 seconds from reacquiring. We'll stand by for communications with the spacecraft.

CAPCOM AOS.

PAO And there's the cue, we have acquisition of signal. And we have data right on schedule. Rog. Zero minus 0.7 minus 0.2.

CAPCOM Hello Apollo 11, Houston. How did it go? Over.

SC Time to open up the LRL doors, Charlie.

CAPCOM Roger. We got you coming home. It's well stocked.

SC Okay. Burn status, LP20. Burn time was 2 plus 30. Pads angles delt EPX after trim was .1, ZGY .9, BGZ .1. Delta VC minus 17.9 010.6 OCS 10.4. Unbalance minus 50.

CAPCOM Roger. Copy, Neil. Sounds good to us. And Apollo 11, Houston. All your systems look real good to us. We'll keep you posted.

SC Roger. Hey Charlie boy looking good here. That was a beautiful burn. They don't come any finer.

CAPCOM Rog. Apollo 11, Houston. I wondered if you compared your state vector accuracy with the one in the LM flights. Over.

SC Yes sir and it looked very nice. Verb 83 was plus 00070 and minus 00008.

CAPCOM Rog. 11, Houston. I was looking at your bank Bravo nitrogen tank, it didn't leak a bit - correction - didn't leak a bit this time. Over.

SC Roger, looked good here. Cabin pressure was hanging in there around 100 the latter part of the burn. It started oscillating a little bit and got down a little bit below 100.

CAPCOM Roger.

SC 96 or so.

CAPCOM Roger.

PAO Most of the conversations so far has been from Neil Armstrong and Mike Collins. That last comment came from Collins. Our first report after acquisition was from Neil Armstrong. That transearth injection burn was very close to nominal. At this time we show the spacecraft traveling at a speed of 7,603 feet per second. The velocity already beginning to drop off and we're at an altitude of 445 nautical miles now from the moon. This is Apollo Control. We now show the spacecraft traveling at 7,378 feet per second. Altitude 568 nautical miles. The next order of business will

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 135:33, CDT 24:06 444/2

PAO be to get the crew to sleep. Flight Director, Gene Kranz, requested his flight controllers, prior to acquisition of signal to review their procedures and to take as many steps as possible to get the crew to sleep as soon as possible. There will be a press conference in the building 1 auditorium. We estimate the time on that at about 12:300 Central Daylight Time. And our LM telecommunications engineer reports that we've just had acquisition of signal from Eagle which is still in lunar orbit. The last fix that we had on Eagle's orbit showed an apogee of 64.1 and a para - apocynthion rather of 64.1 and a paracynthion of 64.4 nautical miles. The spacecraft altitude is now climbed to almost 700 nautical miles from the moon. We show a weight of 26,510 pounds. About 10,000 pounds less than what we had actually about 1100 or 11,000 pounds - lets correct that - about 10,100 pounds less than what we had prior to the transearth injection burn.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 135:46 CDT 24:19 445/1

CAPCOM Apollo 11, Houston. Would you give us PU and accept. We've got a REFSMMAT for you. Over.  
SC Okay.  
CAPCOM Thank you.  
CAPCOM Hello Apollo 11, Houston. We've got the load in. You can go back to block. Over.  
SC We're there.  
CAPCOM Roger.  
SC Your command module sound seems to be working out pretty well, Charlie, the amount we carried. Looks like we carried just about what we needed.  
CAPCOM Wonderful.  
SC We have one 16 millimeter roll on the ASA 1000 color interior film. We were thinking of shooting that during entry window number 4 on bracket and try and get the camera guide sometime in the last couple of days. Give us all a good time for that.  
CAPCOM Roger.  
PAO This is Apollo control. The flight dynamics officer reports that the burn very nominal. Almost precisely as planned, the burn duration was about 3 seconds long, but the velocity change was almost precisely what we had been expecting. At the present time, Apollo 11 is 1076 nautical miles from the moon. The velocity continuing to drop off, down now to 6698 feet per second.

END OF TAPE

PAO This is Apollo Control at 136 hours, 44 minutes. Apollo 11 is now 3,720 nautical miles from the moon and traveling at a speed of 5,367 feet per second. During the press conference we accumulated about 4 minutes of taped conversation with the crew. The crew reports at this time that they are completing taking pictures and they are getting ready to realign their guidance system platform. We'll pick up the tape conversation and then stand by for any following live communications with the crew. We anticipate that they will be shortly beginning their presleep checklist in preparation for a well deserved rest period.

CAPCOM Hello Apollo 11, Houston. I wondered if during the TEI burn you utilized the oxidizer flow valve on the valve on the PUGS. Over.

SC Yes we did. Based on your very excellent briefing I was expecting the thing to continue desiring increase for the whole time since we started out with it in increase. I saw that we pretty quickly crossed the line and started falling about 6 or 7 percent behind. We're still expecting it to move up and then I went down to full decrease and brought it back down to a difference of 2 percent. Over.

CAPCOM Roger. Thank you very much, Buzz.

SC 2 tenths of a percent, I'm sorry.

CAPCOM Roger. Thank you. Apollo 11, Houston. You can go to PTC attitude and torque at your - and do the P52 and torque at your convenience. Over.

SC Hey, we got to take some more pictures, Charlie. Is there any constraint normally in staying here for awhile?

CAPCOM No sir.

SC Thank you.

CAPCOM Go ahead 11. Over.

SC How does that tracking look or is it too early to tell?

CAPCOM Stand by, Mike. Apollo 11, Houston. FIDO's are looking at the data. It's too early to tell yet exactly. It's looking real good so far. We'll have you some answers shortly on trajectory. Over.

SC Yeah. What FIDO is it?

CAPCOM Jay Green.

SC Howdy Jay.

CAPCOM 11, Houston. We have a DAP CSM update for you.

SC Go ahead.

CAPCOM Rog. That CSM weight, Mike, 26370. Over.

SC Thank you sir.

CAPCOM You're welcome. Apollo 11, Houston. We've taken your onboard vector and propagated it for you

CAPCOM and it's looking real good. We only got about 24 minutes tracking now. Really too early to tell on the radar. Over.

SC Roger, I understand.

CAPCOM Hello Apollo 11, Houston. Mike, did you notice any transients at ignition on TEI? Over.

SC Yeah. The transients are more noticeable than on previous burn, Charlie. I just wrote it off on the fact that we had a light command module but there was considerable roll activity which dampened down after the first 20 seconds I would guess after the burn but then there was also some pitch and yaw activity. I don't believe it was abnormal and seemed to be deadbanding ratherly crisply in roll plus or minus about 8 degrees inside the center line and after the first couple of - of after the first 20 seconds or so the gimbals were quiet and pitch and yaw were relatively quiet. Before that there was some oscillation but mostly just in rates-total attitude hung in there pretty well.

CAPCOM Roger. Thank you very much. We were looking at the playback and we saw some things that rather stood up. We'll be back with you later on that.

SC Okay.

CAPCOM Apollo 11, Houston. Have you finished taking pictures? Over.

SC We're just finishing up, Charlie.

CAPCOM Rog.

SC We'll get started on the P52 here pretty soon.

CAPCOM Copy.

SC Garble.

PAO This is Apollo Control. That brings us up to date with the taped conversation. We'll stand by for any further live communication from the crew before they begin their sleep period. We've gotten some preliminary figures from the Flight Dynamics Officer on that transearth injection burn after a review of the telemetry data and it shows that our change in velocity was nominal 3,283.5 feet per second. We also show a nominal burn time of 2 minutes, 28 seconds. The crew reported the burn time about 2 to 3 seconds long based on their onboard data. The ground data shows the burn to have been just about nominal. Based on the preliminary tracking it would appear that the splash down would occur almost precisely as predicted or planned in the flight plan. That would be at 195 hours and 18 minutes, 40 seconds ground elapse time. And we would expect that splash down time to change some what during the transearth coast particularly as the need or lack of need for midcourse correction becomes more apparent with additional tracking. At this time Apollo 11 is 4,086 nautical miles from the moon

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 136:44, CDT 1:15 446/3

PAO traveling at almost precisely 1 mile per second, 5,283 feet per second and that's just updated 5,280 feet per second.

CAPCOM Hello Apollo 11, Houston. You can crank up on the PTC at any time. Over.

SC Thank you.

CAPCOM Apollo 11, Houston.

SC Go ahead, Houston.

CAPCOM Rog, 11. This is the regional CAPCOM. Congradualtions on an outstanding job. You guys have really put on a great show up there. I think it's about time you power down and got a little rest though you've had a mighty long day here. Hope you're all going to get a good sleep on the way back. I look forward to seeing you when you get back here. Don't fraternize with any of those bugs in route except for the hornet.

SC Okay. Thank you boss. We're looking forward to a little rest and a restful trip back and see you when we get there.

CAPCOM Rog. You've earned it.

PAO That exchange was between Donald K, Deke, Slayton, Director of Flight Crew Operations at the Manned Spacecraft Center and astronaut Neil Armstrong.

END OF TAPE

CAPCOM Hello, Apollo 11, Houston. We'd like you to turn off 02 tank number 1 heaters. Over.

SC It's off. Thank you.

CAPCOM Roger.

CAPCOM Hello, Apollo 11, Houston. For your information, the LGC in Eagle just went sailing up about 7 hours. Over.

SC Okay. It's very good, then (garble) a real winner there. Charlie, we're going to rotate about pitch 270 degrees on the way home vice 1 - or 090 on the way out. Right?

CAPCOM Right there.

SC Okay, We're reporting in a maneuver to that attitude is in progress.

CAPCOM Roger.

SC Houston, this status report ready to shut the CDR 11017, CMP 10019, LMP 09020. No medication.

CAPCOM Say again, please, Neil. You were breaking up. We missed that. Over.

SC Okay. This is crew status report radiation CDR. 11017, CMP 10019, LMP 09020. No medication.

CAPCOM Roger. Thank you.

CAPCOM And we didn't get any crew status report from you this morning. Wondered if you could give us an estimate of sleep last night. Over.

SC (Garble.) Okay. I'll take a guess, Charlie, and try to give a conservative amount. CDR 3 and LMP 4.

CAPCOM Roger. Thank you very much.

SC And Com, you want the (garble), right?

CAPCOM That's affirmative and we'd like you to disable on quad Charlie and Delta. Over.

CAPCOM Apollo 11, Houston. If it's convenient, we'd like to go through your onboard readout. Over.

SC Of what?

CAPCOM Oh, excuse me. It's on the flight plan 3102. We'd like to have (garble) and RCS. Over.

SC Stand by. Ready to copy, yet?

CAPCOM Roger. Go ahead.

SC That's Charlie 370, pyro mat A 370, mat B 370, RCS 55, 65, 64, and 62. Over.

CAPCOM Roger. We copy all that. Thank you much.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 127:04 CDT 1:35 448/1

(Dead Air)

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 1:45 GET 137:14 449/1

CAPCOM Apollo 11, Houston. A couple of questions for the moon walkers, if you got a second. Over.

ARMSTRONG Go ahead.

CAPCOM Roger, Neil. We're seeing some temperature rises on the passive seismic experiment that are a little higher than normal and were wondering if you could verify the deployed position. We understand it is about 40 feet from the LM in the 11 o'clock position. Over.

ARMSTRONG no, it's about in the 9 or 9:30 position and I'd say it's about 50 or 60 feet.

CAPCOM Roger. Copy. Also did you notice - was there any indication of any dust cloud as you lifted off? Over.

ARMSTRONG Not very much. There was quite a bit of Kapton and parts of the LM went out in all directions and usually in the same distance as far as I can tell, but I don't remember seeing anything of a dust cloud.

CAPCOM Roger. I understand all you could see were parts of the LM going out. What was your first comment on it?

ARMSTRONG It was Kapton and other parts of the LM of staging scattering all around the area at great distances but I didn't see a dust cloud.

CAPCOM Thank you very much.

COLLINS Houston. Apollo 11. Did you keep me honest on the lithium hydroxide changes. When do you have the next one scheduled for?

CAPCOM Standby.

CAPCOM Apollo 11, Houston. Michael on that canister, we had you due to change one at 1:33 before TEI and it's on page 399. The next one we got is at 1:47. Over.

COLLINS Okay.

END OF TAPE

CAPCOM Hello, Apollo 11, Houston. We'd like to extend our damping period for another 5 minutes, let the rates get way down. Over.

SC 11. Roger.

PAO This is Apollo control at 137 hours, 27 minutes. At this time, Apollo 11 is traveling at a speed of about 4982 feet per second. At about 5900 nautical miles from the moon, and about 198 900 nautical miles from earth. A short while ago, you heard Neil Armstrong make a few descriptive comments of the scene on the lunar surface at the time the planned ascent stage lifted off. Armstrong reported seeing very little dust, but quite a bit of debris from the LM. He referred to the Kapton, which is a plastic-like insulation material generally silver or gold in color which is found on the outside surface of the LM. And, we also had a report at 136 hours, 54 minutes, about 40 minutes or so ago that the LM guidance computer had finally stopped putting out any data, and that was about 7 hours, 13 minutes after the primary guidance system was deprived of the coolant, a test of how the system would continue to operate without coolant. The platform apparently begin to become unuseable after about 4 hours, and the computer itself finally gave up after about 7 hours, 13 minutes. Both items going considerably longer than had previously been predicted. The lunar module ascent stage still in lunar orbit. We are continuing to get data from it. All other systems appear to be functioning well at this time. The LM orbit we show as currently 64.4 nautical miles for height of apocynthion, 54.4 nautical miles for pericynthion. And, the LM is in its 23rd revolution, and here's a call to the crew.

CAPCOM Over.

SC Thank you, Charlie, and I think we'll bring you up to date on our chlorination status. In compartment B4, we have 1, 2, 3, 4, 5, 6, 7 - correction - we have 8 pockets for chlorine and buffer ampules of which - let me correct that. We have 7 pockets of which one is empty and always has been empty, leaving 6 remaining. And, the other side, over there in the B7, we have another container with 7 pockets, so we have a total of 7 plus 6 and those are filled with 6 chlorines and 7 buffers. Now, I've been using one chlorine and one buffer per day which, at this point and time, prior to this chlorination I'm about to do, leaves me one chlorine and two buffers. Seems to me I'm one chlorine short, and that being the case, I'd like to (garbled) you right on postponing this chlorination using the last container until some later date like maybe tomorrow. Over.

CAPCOM Roger. We copy, Mike. Stand by.

SC Okay.

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 137:34, CDT 2:05 451/1

CAPCOM Hello Apollo 11, Houston. Check in Al Mike and see what you can find in there. Over. We think you might have some more chlorine up in Al. Over. Hello Apollo 11, Houston. Apollo 11, Houston. Do you read? You're breaking up. Over.

SC Roger. We hear.

CAPCOM Roger, 11. You're breaking up. Mike, please look in component Al. We think there might be some more chlorine up there. Over.

SC Eureka.

CAPCOM 11, Houston. Reading you about 1 by. Over. Apollo 11, Houston. We're having a down link problem. That's the reason we can't read you. We're switching sides. Stand by. Hello Apollo 11, Houston. How do you read now? Over.

SC Fine.

CAPCOM Rog. You're 5 by on that too, Mike. Thank you much. Did you copy that about Al on that chlorine?

SC Eureka.

CAPCOM How about that sports fans.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 2:15 GET 137:44 452/1

CAPCOM Apollo 11, Houston. We're having a little trouble getting the yaw rate damped out to the appropriate value. We'd like you all to be quite like mice for a couple of minutes and let's see if that will help it out. Over.

CAPCOM 11, Houston. You did great work there. We're ready to spin it up. Over.

CAPCOM 11, Houston. Did you copy? Over.

SC Yes. We read you, Charlie? Would you stand by a minute?

CAPCOM Roger. No hurry.

CAPCOM 11, Houston. Shift change time here. White team bids you good night. We'll see you tomorrow. Over.

SC Okay, Charlie. Thank you.

SC Right, Charlie. Thank you.

SC Adios.

CAPCOM Adios. Thanks again, for a great show, you guys.

SC Thanks for a great show down there.

PAO This is Apollo Control at 137 hours, 52 minutes. Apollo 11 crew has signed off for the night, starting a well deserved rest period. Duration of the rest period is programmed for 10 hours, however, the wake up time is not critical. It's very likely that we'll let them sleep until they wake up of their own accord. At this time Columbia is 7,045 nautical miles away from the moon, headed toward home at a velocity of 4,868 feet per second.

END OF TAPE

PAO This is Apollo Control at 138 hours 02 minutes. CAPCOM Owen Garriott has just put in a call to the crew and is passing up some antenna information to them. Here's that conversation.

CAPCOM Howdy there, Mike. We're ready to go ahead and have you put your OMNI position for your sleep period, and we would like the following high gain put positions: your high gain antenna in MANUAL, beam was WIDE, pitch is minus 50, and yaw is a plus 270, and just follow the flight plan for remaining comm configuration. Over.

SC Roger and out. It's liable to be (garble) pretty hard.

CAPCOM Your comm is pretty weak at this point, Mike. Please say again.

SC Roger. (Garble).

PAO This is Apollo Control. Ten minutes ago we logged what we expect to be our last contact with Eagle in lunar orbit. That coming at 137 hours 55 minutes Elapsed Time. At that time the battery power fell below the level where the secondary guidance system could hold the attitude of the vehicle within the sphere of antenna limits. We do not expect to establish contact with Eagle again. We'll continue to stand by here live. There may be a little more conversation before the crew turns in for the night.

CAPCOM Apollo 11, Houston. We'd like for you to go ahead and put on S-Band antenna OMNI to OMNI and OMNI B. Over.

CAPCOM Apollo 11, Houston. How do you read me through Honeysuckle now. Over.

SC You're loud and clear. Over.

CAPCOM Very good. Reading you better now, and did you copy we'd appreciate going S-Band OMNI and OMNI B at this time. Over.

SC Roger. (Garble).

CAPCOM Okay, thank you.

SC (Garble).

PAO This is Apollo Control at 138 hours 11 minutes. We do not intend to contact the crew during this rest period again. We will take this lying down now and come back up if there is further conversation. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 139:00 CDT 3:33 454/1

PAO This is Apollo control at 139 hours. The crew of Apollo 11 is in the rest period. We have not contacted them within the last hour, and have not heard from them. All systems aboard the spacecraft performing well. Apollo 11 is now 10 149 nautical miles from the moon approaching the earth at a velocity of 4659 feet per second. Spacecraft weight is 26 510 pounds. This is mission control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 4:33 GET 140:00 455/1

PAO This is Apollo Control at 140 hours. Apollo 11 is now 12 835 nautical miles from the moon. Velocity 4552 feet per second. All systems still performing well. Dr Kenneth Biers, the flight surgeon, reports his data indicates all three of the crewmen are asleep. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 141:00, CDT 5:32 456/1

PAO This is Apollo Control at 141 hours. Apollo 11 is 15,488 nautical miles from the moon. Velocity 4,480 feet per second. The crew is still asleep. All systems continuing to perform very well. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 6:35 GET 142:03 457/1

PAO This is Apollo Control at 142 hours 03 minutes. Apollo 11 is 18 243 nautical miles from the moon. Velocity 4426 feet per second. Apollo 11 is in the passive thermal control mode, the performance of all systems nominal, and the crew is asleep. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 7:32 GET 143:00 458/1

PAO This is Apollo Control at 143 hours. Apollo 11 is 20 704 nautical miles from the Moon, velocity 4390 feet per second. The crew is still in the rest period. The weather bureau's space flight meteorology group reported this morning that weather conditions in the primary landing area are expected to be acceptable, the sky partly cloudy, the winds easterly at 10 knots, and seas of 3 feet are predicted. Tropical storm Claudia is now located 2300 miles east of the landing area and will not affect the weather in the landing area Thursday. This is Mission Control Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-22-69, GET 144:00, CDT 8:32 459/1

PAO This is Apollo Control at 144 hours. Apollo 11 is 23 289 nautical miles from the moon approaching the earth at a velocity of 4 361 feet per second. All systems performing well, and the crew still in their rest period. It does not appear likely that we will perform midcourse correction number 5 scheduled for approximately 150 1/2 hours elapsed time. However, a firm decision on this midcourse will not be made for approximately 3 1/2 hours. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, CDT 9:32, GET 145:00, 460/1

PAO This is Apollo Control at 145 hours. Apollo 11 is 25 857 nautical miles from the moon. Heading toward home at 4338 feet per second. Apollo 11 will leave the moon's sphere of influence at an elapse time of 148 hours 7 minutes 23 seconds. This is Mission Control, Houston.

END OF TAPE





PAO This is Apollo Control at 147 hours, 39 minutes. The flight surgeon reports that all 3 crew are now awake. We expect to be hearing a Good Morning from the spacecraft before too much longer so we'll stand by for that. We said Good Night to the crew last night at about 137 hours, and 47 minutes so they have apparently had a good 10-hour rest period and we'll probably be getting a crew status report indicating just how much sleep each of the crewmen got. We'll stand by for any conversation with the spacecraft.

SC Good afternoon, Houston. Apollo 11.  
Over.

CAPCOM Good morning, 11, this is Houston.  
Over.

SC Okay. New status report, 88 and 8.5.

CAPCOM Roger. 88 and 8.5. When you are ready we've got a small flight plan update for you.

SC Houston, we are ready to copy.

CAPCOM Roger. At about 148 hours, if you have not already done so, a CO2 filter change and the H2 purge line heater-on 20 minutes before the O2 and H2 purge. At 148 hours we'd like you to initiate a charge on Battery Alpha instead of at 151 hours and leave the charge on until we notify you further. At 150 hours GET waste water dump to 10 percent. We do plan to burn the midcourse correction 5; It will be an RCS burn about 5 feet per second at about the nominal time and place. Over.

SC Roger. Understand. We will be accomplishing the filter change shortly, the purge line heater-on, O2 and H2 purge shortly, and at 148 will initiate a charge on Battery A until you advise further. At 150 hours waste water dump to 10 percent. We are looking forward to midcourse correction 5 at about 5 feet per second nominal time. Over.

CAPCOM Roger. I've got your consumables updated. Are you ready to copy?

SC Copy.

CAPCOM Okay. At GET 147.00 RCS total - minus 2.0 percent which is about minus 14 pounds, Alpha, minus 12.0, B Ravo plus 10.0 minus 3.0 minus 1.0. Hydrogen total minus 1.5 pounds, O2 total plus 20 pounds. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-22-69, GET 147:51, CDT 12:23 465/1

SC Roger. I'll give you our onboard readouts. Alpha, 52 percent; bravo, 54 percent; coco, 54 percent; delta, 61 percent.

CAPCOM Roger, 11. Would you read that quad alpha again, please. Buzz, you're cutting out. It may be Neil operating on VOX. Over.

SPACECRAFT Negative. Alpha is 53 percent.

Over.

CAPCOM Roger, we copy. 11, from down here. On telemetry, all your systems look to be in good shape.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger, would you have Buzz to check his biomedical PM sensors for a loose or dried out sensor. We're getting an erratic electrocardiogram reading. That would be one of the three sternal leads. Over.

SC Okay.

SC (garbled)

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, CDT 12:35, GET 148:03, 466/1

CAPCOM .. Apollo 11, this is Houston. Say again your last, please.

SC Disregard.

CAPCOM Roger, out.

PAO This is Apollo Control at 148 hours 7 minutes. In about 24 seconds from now, the spacecraft will pass the imaginary line into the Earth's sphere of influence.

CAPCOM Stand by for a mark leaving the lunar's sphere of influence. Mark you leaving the lunar's sphere of influence, over.

SC Roger. Is Bill Shaffer down there.

CAPCOM Negative. We've got a highly qualified team on instead.

SC Roger. I wanted to hear him explain it again at the Press Conference.

CAPCOM Okay.

SC That's old Apollo 8, but tell him the spacecraft gave a little jump as it went through the sphere.

CAPCOM Okay, I'll pass it on to him. Thanks a lot, Dave Reed is here burying his head in his arms right now.

SC Roger, out.

SC Those guys down there in the press room did a pretty good job this month.

CAPCOM Yes, they have.

SC Are we - have to give up yet?

CAPCOM No, you'll hang in there for about another 47 hours or so.

SC That's good.

END OF TAPE



CAPCOM

Say again, 11.

SC

Roger, we're all listening. Go ahead.

CAPCOM

Roger. From the hot wires of the Public

Affairs Office: Apollo 11 still dominates the news around the world. Only 4 nations, Communist China, North Korea, North Viet Nam, and Albania, have not yet informed their citizens of your flight and landing on the moon. One newsman said that he has run out of ways to describe your success. Tonight President Nixon is scheduled to watch the All-Star baseball game in Washington. After the game he will depart for the Pacific recovery area. Wednesday evening he will fly from Johnston Island by helicopter to the Navy Communications ship Arlington. Then on Thursday morning he will reboard the helicopter and fly to the Hornet in time to witness your splashdown. Accompanying the President will be Secretary of State William Rogers and Frank Borman. They will watch the splashdown from the bridge of the recovery ship with Admiral John Sidney McCain, Jr., Commander of the Pacific Forces. Following the President's stay aboard the Hornet he will depart for his tour of Asia and scheduled visit to Romania. Luna 15 is believed to have crashed into the Sea of Crises yesterday after orbiting the Moon 52 times. The Soviet News Agency Tass reported that "scientific research in near-moon space was carried out." Sir Bernard Lovell at Jodrell Bank Observatory said that Luna 15 hit the surface of the Moon at a speed of about 300 miles per hour. Things have been relatively quiet recently in Viet Nam. G.I.'s on patrol were observed carrying transistor radios tuned into your flight. The Armed Forces Network radio and TV network in Vietnam gave the mission full coverage. Skirmishes still continue between the Egyptians and Israeli's along the Suez Canal. U.N. observers there are trying to halt the action. IN Washington, the House Ways and Means Committee has voted to reduce the 27.5 percent oil depletion allowance to 20 percent. We've had rain several times here in the Houston area. Today it is cloudy and more showers are expected. On the sports front, as we mentioned earlier, the All-Star game is tonight. There were no games played yesterday. Last night, in New York, the Baseball Writers Association of America named Babe Ruth the greatest ball player of all time. Joe DiMaggio was named the greatest living ball player. Frank Borman made the announcements at a dinner honoring the players. Joe Namath put in a full day at the New York Jets training camp. Five policemen had a hard time restraining about 500 kids who wanted to touch Broadway Joe. He said he feels fine and says he will play in the All-Star game August 1, if Coach Weeb Eubank lets him. The Oilers camp at Kerrville got wet yesterday, but the workouts continued. There have been some minor injuries, but nothing too serious. Coach Wally Lemm is satisfied so far with the workouts.

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 12:55 GET 148:23 468/2

CAPCOM                    The Oilers are expecting attendance of over 30 000 for the preseason game with Buffalo. Apparently Don Meredith's announced retirement isn't expected to dampen enthusiasm, especially around here in Houston. Mario Andretti won the 200 mile Trenton Auto Race Sunday and is now the leading race driver in the U.S. Auto Club's point standings. And that's about the summary of the morning news this afternoon in Houston. Over.

SC                        Marvelous. Look up the Dow Jones Industrials for us.

CAPCOM                    Roger, stand by a minute, please.

CAPCOM                    Apollo 11, this is Houston. We see you in POO. When you can give us ACCEPT we have a state vector and target load uplink ready for you.

SC                        Roger, Houston. I'm going to go ahead and start the computer.

CAPCOM                    Roger, thank you.

END OF TAPE

CAPCOM Apollo 11, we have completed the uplink. The computers is yours.

SC Thank you.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM Roger. With respect to the Dow Jones Industrials since closing on Tuesday afternoon the 15th, up to about 1:05 P.M. Houston time this afternoon, the effective net drop, that is minus 6 points on the industrial average. So far today since opening the Dow Jones Industrial Average has gone down by 11.05 points after rising 1 and one-half shortly after opening. Today's performance on the utilities is a drop of 1.63 and railroads a drop of 1.58. Over.

SC Every flight has to have some disadvantage, I guess.

CAPCOM Roger. There is some speculation that you all are responsible for that 1 and one-half point rise right after opening.

SC Well, I don't believe they'll put that drop on us anyway.

CAPCOM Roger.

CAPCOM Apollo 11, this is Houston. If you have a minute or so free, I wonder if we could get Mike to give us a little bit of clarification on what happened around about the time of docking. We copied him as mentioning contact was very smooth, almost imperceptible and we're a little bit inquisitive or curious about his remarks as to what happened after probe retraction. Over.

SC Roger. I docked in CMC auto and as I said I wasn't really sure at the moment of contact and I kept checking the docking probe indicators. I got two barber's poles indicating that the three capture latches, er, not capture latches, but the three gizmotches had made and we were soft docked; and at that time the situation looked very stable so I went to CMC's free, glanced back out the window and it still looked stable and I fired primary 2 bottle. And at that time a gyration began between the two vehicles due - I am not sure to what, perhaps the LM dropping or perhaps it was building up prior and I had not noticed it. But anyway, during the retract of the probe, there were yaw-my-yaw excursions of, I would guess, around 15 degrees and I had to come back on take the free switch and throw it back to auto and try to damp them out and I guess Neil was doing the same in the LM. I will let him tell you about his side of it. And I thought that we were

SC not going to get a successful retraction and hard dock, However, in about I guess 6 or 8 seconds, I could see the situation damping out and we heard the noise indicating the docking latches had fired and later on when I got into the tunnel, all 12 of them had properly engaged.

CAPCOM

Roger.

SC And on the LM side, we were in AGS MIN deadband holds and at contact I thrusted plus X and shortly after that we had sizeable attitude oscillation and thruster bearing so we opened up the deadband to max and manually flew the vehicle into stable attitude during the retraction. It went off after (garble) retraction.

CAPCOM

Roger. Thank you very much. Out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, CDT 13:21, GET 148:49, 470/1

CAPCOM Apollo 11, this is Houston. I have your midcourse correction 5 pad available when you're ready to copy.

SC Stand by.

SC Houston, Apollo 11, ready to copy.

CAPCOM 11, this is Houston. Midcourse correction number 5. RCS G&N 26025, pitch and yaw trim NA, tig 150 29 54 53 minus 000 48 plus all balls plus 00001 075 159 328 HA is NA, HP plus 00 230 00048 011 00048, sextant an star 03 09 08 382. For site star nblock not available. Latitude plus 11 02 minus 172 04 11 803 36 275 195 03 33 GDC align Deneb and Vaga. 007 144 068, no ullage, of course, 4 quad thrusting, over, read back.

SC Roger, midcourse number 5, RCS G&N 26025, pitch and yaw NA, 150 29 54 53 minus 000 48 plus all zeros plus 00001 075 159 328 NA plus 00 230 00048 011 00048 03 09 08 382 NA three times, plus 11 02 minus 172 04 11 803 36 275 195 03 33 Deneb and Vaga 007 144 068 4 quad for the burn, over.

CAPCOM Apollo 11, this is Houston, read back correct, out.

PAO This is Apollo Control at 148 hours 58 minutes. The series of numbers passed up to the crew a few minutes ago was for the midcourse correction number 5. That is scheduled to occur 150 hours 29 minutes 54 seconds. It will be a Reaction Control System Burn using the spacecraft reaction control system thrusters. With a velocity change of 4.8 feet per second, and that will be retrograde. Primary purpose of the maneuver will be to adjust the entry conditions which is - would primarily be for corridor control, controlling the flight path angle at entry. And the current predicted splash time in the Pacific is 195 hours 17 minutes 25 seconds. At the present time Apollo 11 is 172 654 nautical miles from the Earth, traveling at a speed of 4017 feet per second. We estimate that the spacecraft will be half way home at a ground elapse time of 159 hours 53 minutes 43 seconds. At that point the spacecraft will 145 583 nautical miles from the Earth's surface, and we will have completed half of the return trip measured from lunar orbit insertion to splashdown. Now we also have another figure that - before the time of which the spacecraft velocity is equal with respect to both the Earth and the moon. At that point the velocity will be 4300 feet per second with respect to both bodies. And we would define this as the equal potential point. That will occur at 155 hours 30 minutes. And at that time the spacecraft will 156 874 nautical miles from the Earth, 52 543 nautical miles from the moon. We're now 1 hour 28 minutes 26 seconds from ignition for the midcourse correction 5 maneuver.

CAPCOM Apollo 11, this is Houston, over.

SC Roger, go ahead Houston.

APOLLO 11 MISSION COMMENTARY, 7/22/69, CDT 13:21, GET 148:49, 470/2

CAPCOM Roger, if Neil has a free minute, we've got a question or two regarding the CO2 partial pressure and water in the suit loop discrepancy noted yesterday, over.

SC Go ahead.

CAPCOM Roger, 11. Was water noted in both suits or only in yours, Neil?

SC I think only in my suit.

CAPCOM Okay, can you locate that occurrence for us in time when you first noticed water in the suit either by mission time or relation to any particular event.

END OF TAPE

SC I think it was after insertion sometime, Bruce. I don't remember exactly when. It was when we were in orbit and had - after we took our helmets off.

CAPCOM Roger, did you call it to us when you first noticed it, or was it sometime after when you called us?

SC It just might have been probably 20 minutes after I noticed it that I mentioned it to you.

CAPCOM Roger. Was this noticing the water accompanied by your erratic CO2 partial pressure readings, or was that a separate problem? Over.

SC Well, the water problem evidenced itself before we noted any erratic motion the PCO2 gage.

CAPCOM Roger. What was the relative sequence on selecting water separator number 2 and the secondary CO2 canister - that is, did you go to the secondary water separator first and then the secondary CO2? Over.

SC I believe we went to secondary CO2 first.

CAPCOM Roger, we copy. Was there any change in your suit loop count? Go ahead.

SC I should mention Bruce that when I went to water secondary - water separator to secondary. I didn't notice any change, but about after 15 minutes or 20 minutes the water stopped coming out. So, maybe that was just water that was already in the loop that was still blowing out, but the secondary water separator was operating properly.

CAPCOM Roger, did you make any changes in the suit loop configuration after you went from the egress mode to the cabin mode after insertion - that is, in particular, they're interested in knowing if you recall changing the divertor valve position to egress any time while you were on the secondary canister? Over.

SC No, I don't believe we did that at all Bruce.

CAPCOM Okay, ll. Thank you. That sums up our questions for now, and we'll crank these back into the engineering pipeline and see what we can come up with.

SC Okay. Are you satisfied that the CO2 circuit breaker was in (garble)? Over.

CAPCOM Say again, please.

SC Roger. In that jettison, are you satisfied that the CO2 circuit breaker was in? Over.

CAPCOM Yes, it was in.

SC Roger, could you confirm that? I thought there was some question after we got into the command module as to whether that had been left in or not. Over.

CAPCOM Roger, ll. It was in and confirmed in, and the readings after jettison say about .1 to .2.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-22-69, GET 149:19, CDT 13:51 472/1

CAPCOM Apollo 11, this is Houston. We have not noted any change in the signal coming through on the LMP's EKG. When he has a little free time, we'd like him to check into it again. Over.

SC Roger, I looked at all three of the upper chest Pendulums, and they appear to be fairly tight. I'll press them back in again. Over.

CAPCOM Roger. On the TM here we noticed some fluxuations that may have been attributed to your moving the sensors around and pushing on them, but the erratic problem seems to be persisting.

PAO This is Apollo Control at 149 hours, 41 minutes. We're now about 49 minutes away from the first midcourse correction of this transearth leg of the Apollo 11 flight. That maneuver will be a 4.8 foot per second burn of the spacecraft reaction control system thrusters and is scheduled to occur at a ground elapsed time of 150 hours, 29 minutes, 54 seconds. At this time Apollo 11 is 171 017 nautical miles from the earth, and the spacecraft velocity is 4 043 feet per second.

SC Houston, Apollo 11. Over.

CAPCOM 11, this is Houston. Over.

SC Roger. I wonder if you have noticed any change in the biomedic sign you're getting. Over.

CAPCOM Negative, Buzz. Still looks kind of bad. Apparently when you move around, it's cutting in and out. Have you checked the little electrical connector where it goes into the signal conditioner? Over.

SC I did. They're all about as tight as can be. I tell you what I'll - I'll take them out and put them back on again to see if that makes any difference.

CAPCOM Okay, if you would at your convenience. We'll be watching it down here.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 14:17 GET 149:45 473/1

PAO This is Apollo Control at 150 hours 4 minutes. Telemetry data at this time shows the spacecraft in the proper attitude for the upcoming midcourse correction maneuver. The crew will soon be verifying their attitude by taking a sighting on a star through the sextant and will be running some tests on the guidance control system and the reaction control system before the maneuver takes place. That burn now scheduled to come a little over 25 minutes. Apollo 11 is now 170 102 nautical miles from the Earth and the spacecraft velocity is 4058 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, CDT 14:42, GET 150:10, 474/1

CAPCOM Apollo 11, this is Houston. We'd like you to try acquisition on the high gain antenna for us at PITCH minus 90, YAW 270. Over.

SC Roger. Got us some work.

CAPCOM Roger, out.

CAPCOM 11, this is Houston. We're showing about 6.8 percent on waste water on our telemetry now. Over.

SC Okay, we've got about 9 up here. Over.

CAPCOM Roger, out.

CAPCOM 11, Houston. We're standing by for your burn. Everything's looking good from down here.

SC Thank you Bruce. You've got about a minute and 20 seconds.

CAPCOM Roger, we concur.

PAO One minute until midcourse correction number 5. It will be a 10.9 second burn of the spacecraft reaction control system thrusters giving a change of velocity retrograde of 4.8 feet per second. The primary purpose of this maneuver will be to control the spacecraft flight path angle at entry interphase. We're now less than 30 seconds from the initiation of the burn.

PAO They should be burning at this time. And we show the burn off.

SC Houston, do you copy our residuals?

CAPCOM Roger, we've got your residual fuel count reading for us.

SC DELTA VC is plus .2.

CAPCOM Roger. Plus .2.

SC That was actually plus 100.2. Okay?

CAPCOM Okay.

PAO That midcourse correction was performed at a distance of about 169 000 nautical miles from the Earth at a spacecraft velocity of 4075.6 feet per second.

END OF TAPE



CAPCOM Apollo 11, this is Houston, over.

SC Apollo 11, Houston.

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead, Houston.

CAPCOM 11, we're still seeing rates on your spacecraft above those we would like for and the continuation of the PTC mode which we are still monitoring it and we'll advise you when it has settled down, over.

SC Okay.

PAO This is Apollo Control at 151 hours 11 minutes. The crew is presently setting up the spacecraft for passive thermal control. Once it stabilizes out it will begin a slow roll rate of three revolutions per hour to maintain temperature control. At the present time Apollo 11 is 167,448 nautical miles from the Earth and the velocity is 4,101 feet per second.

CAPCOM Apollo 11, this is Houston. You are go - you are set up on PTC, over.

SC Thank you.

SC Houston, Apollo 11, over.

CAPCOM Go ahead 11.

SC It didn't like it that time. When I got down to the entry 27303 enter, it took off in roll at a high rate and in excess of one degree per second. We are going to stop it now and we are going to have to go back and do it over again. I would like to try find out the reason it did that.

CAPCOM Roger, it might as well start setting up for it and we will be working the problem here.

SC Okay. You do have us on high bit rate here now?

CAPCOM That's affirmative.

SC Okay, good. I'll maneuver back to PTC Ignition Attitude while you guys look at the data and see what you think.

CAPCOM Roger.

END OF TAPE

CAPCOM Apollo 11, this is Houston. While you're waiting for the CSM to settle down and for us to look at the tapes on your latest maneuver, would you feel like answering some more questions with relation to the lunar surface? Over.

SC Go ahead.

SC Go ahead, Houston.

CAPCOM Roger. For 64 000 dollars we're still trying to work out the location of your landing site, Tranquility Base. We think it is located on LAM2 Chart at Julia .5 and 7.8. Do you still have those charts onboard? Over.

SC Stand by one. They're packed.

CAPCOM Roger. You may not have to unpack it. The position which I just gave you is slightly west of west crater. I guess it's about two tenths of a kilometer west of it, and we were wondering if Neil or Buzz had observed any additional landmarks during descent lunar state or ascent which would confirm or disprove this. One thing we're wondering about is that if you were at this position you would have seen the Cat's Paw during the ascent just up to the north of your track. Over.

SC We were looking for the Cat's Paw too, thinking we were probably downrange, beyond the Big Z. But I think that it's likely that that might have been West crater that we went across in landing, but - Stand by.

SC We're hoping, Bruce, that our 16 millimeter film was working at that point in descent and we'll be able to confirm our touchdown position. We thought that during ascent we might be able to pick up some recognizable objects close to the landing site, and we did see a number of small craters and crater rows and things like that, which we may be able to pick out after the fact, but we haven't been able to yet.

CAPCOM Roger. And the next question from our panel is for Buzz. We recall that he reported seeing a laser upon AOS of the Earth the first time after - the first REV after ascent, and we're wondering what color the beam was and if he could determine at the approximate location with respect to the Earth. Over.

SC It was mostly white - perhaps a tinge of yellowish color to it, and it seemed to be, as I recall it, the terminator of the Earth was toward the horizon and seemed to be about a quarter to a third of the way down from - down towards the terminator of the Earth from the opposite horizon. That's a third to a quarter of the Earth's radii. Over.

CAPCOM Roger, and that puts it in the light side. Over.

SC Roger. Yes, it was in the light side. The Earth was about two thirds lit - Earth, with the terminator down toward the horizon. And now, coming from the opposite

SC LM of the Earth, the sunlight LM, coming down about one quarter to one third of a radius in from the LM. Generally, pensively located with respect to a line drawn perpendicular to the terminator that goes through the center. Over.

CAPCOM Roger, Buzz; we copy.

SC And I got pictures of that. I'm sure that will show up.

SC And I saw that too. It was a very bright spot of light and I confirm Buzz's observation of its position.

CAPCOM Okay, 11, very good. Now with respect to the documented sample container on television it appeared to us as though the samples for that container were in fact being - given - being selected in accordance with some thought or consideration being given to the rocks themselves, and we were wondering if you could give any further details from memory about any of these samples, and the context of the material or the surface from which they were taken. Over.

SC Yes, you remember I initially started on the cut side of the LM that the TV camera was on, and I took a number of samples of rocks off the surface and several that were just subsurface, and about 20 - 15 to 20 feet north of the LM and then I recalled that that area had been probably swept pretty well by the exhaust of the descent engine, so I crossed over to the southern side of the LM and took a number of samples from the area around the elongate double crater that we commented on and several beyond that and tried to take as many different types - of rock types as I could see by eye as I could in the short time we had available. There were a number of other samples that I had seen earlier in our stroll around the LM that I had hoped to get back and pick up and put in the documented sample, but I didn't get those and I'll be able to comment in detail when we get in the debriefing session.

CAPCOM Roger. Did you observe any small craters with conspicuously blocking rims? Over.

END OF TAPE

SC - well except for the one big one that we went over, I guess they're were none in our area. I took a stroll back after putting up the PSEP and all. Buzz was starting to unpack the documented samples. took a stroll back to a crater behind us that was maybe seventy or eighty feet in diameter and fifteen or twenty feet deep. We took some pictures of it. It had rocks in the bottom. We were essentially showing no bedrock, at least in the walls of the crater at that depth. Over.

CAPCOM Roger. We copy. Okay, thank you Neil. That about wraps up the questions we have on hand for now.

SC My compliments to the chef. It's very outstanding. This cream of chicken soup, I get at least 3 spoons.

CAPCOM Okay. Cream of chicken, 3 spoons.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead.

CAPCOM 11, we concur that having worked 16 NOUN 20 up on the DSKY may well have had some effect on your PTC initiation. It works like this with - give what the computer work with the noise of the axle, PDU angles. What we'd like you to do is do a CDU 0 which is VERB 4 O's NOUN 2 0 ENTER and then start the PTC procedure again at step 2 with loading VERB 6922 desired attitude in the AUTO maneuver and all that. OVER.

SC Okay. The only I understand about that is why it took off at the rate it did. What rate should it had taken off at under that theory.

CAPCOM Stand by a minute, Mike.

CAPCOM 11, CMP, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM Mike, over here on page 9-7 of your checklist where we're setting up PTC, there's been a note penciled in after wait 20 minutes for rate to damp. Do not mark a VERB 16 NOUN 20. It turns out that the significance of that is that if you are monitoring 16 NOUN 20 then when you get down here in step 7, the second time you do a VERB 24 you've got to reload the NOUN 01 to make it VERB 24 and NOUN 01 ENTER before you load the three registers. Over.

SC Roger. I was just questioning the rate at which the maneuver would begin if that were not done.

CAPCOM Roger. We're still working on computing the rates for you.

CAPCOM Apollo 11, this is Houston. We'd

CAPCOM like you to select reacq mode in the high gain antenna. Looks like we're about to lose you. Over.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 151:56, CDT 16:28 479/1

SC And I'll be able to comm out  
in detail what we can in the debriefing session.  
CAPCOM Roger. Did you observe any  
small craters with conspicuously blocky rims? Over.

PAO This is Apollo Control at  
152 hours 9 minutes. At this time, the crew is getting the  
spacecraft set up to reinitiate the passive thermal control.  
Apollo 11 currently 165,143 nautical miles from the earth  
and traveling at a speed of 4,142 feet per second. The flight  
plan has relatively few activities scheduled for now through  
the beginning of the crew sleep period tonight. We do have  
a television transmission scheduled. I believe, the time  
on that is a little after 8:00 PM Central Daylight Time.  
And we show the sleep period to begin at about 160 hours  
ground elapsed time, or a little less than 8 hours from  
now. We'll continue to stand by for any conversation with  
the crew. It has been relatively quiet for a good part of  
today. We'll stand by for a call from the capcom or from  
the spacecraft down to the ground.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 151:11, CDT 16:43, 480/1

CAPCOM Apollo 11, Apollo 11, this is Houston  
broadcasting in the blind. If you read us attempt to acquire  
on omni antennas, attempt to acquire on omni antennas, if  
you read. This is Houston, out.

CAPCOM Apollo 11, Apollo 11, this is Houston  
broadcasting in the blind, do you read? Our contact position  
on an omni antenna, our contact position using an omni  
antenna, over.

CAPCOM Apollo 11, Apollo 11, this is Houston  
broadcasting in the blind. If you read attempt to contact  
using an omni antenna, this is Houston, out.

PAO This is Apollo Control at 152 hours  
29 minutes. In the process of reestablishing the passive  
thermal control with the spacecraft in a slow rotation,  
we have apparently lost high gain lock on and we expect that  
the crew will reacquire lock with the antenna once the  
passive thermal control is reestablished. At the present  
time Apollo 11 is 164 thousand 320 nautical miles from the  
earth and the velocity is up now to 4 thousand 156 feet per  
second. We'll continue to stand by here for reacquisition  
of the spacecraft, for reestablishment of high gain lock  
on.

END OF TAPE

CAPCOM Apollo 11, Apollo 11, this is Houston broadcasting in the blind. If you read us, attempt acquisition using an OMNI antenna - attempt acquisition using an OMNI antenna. This is Houston, out.

SC Hey, Goldstone.

CAPCOM Apollo 11, Apollo 11, this is Houston. Radio check, over.

(?) (garbled).

CAPCOM Apollo 11, this is Houston. How do you read, over?

SC Loud and clear, Bruce.

CAPCOM Roger, what antenna are you using?

SC Houston, Apollo 11 has gone into high gain. How do you read, over?

CAPCOM Well, you are loud and clear on the high gain.

SC So what's new?

CAPCOM Oh, we were wondering what was new with you up there.

SC Oh, very quiet. We're just sitting here letting the thruster firing damp down when they - Houston let us know and we will start this PTC.

CAPCOM Roger.

SC Nice to sit here and watch the Earth getting larger and larger and the Moon smaller and smaller.

CAPCOM Roger. We'll give you a call when your rates have damped down sufficiently and we are unable at the present time to predict what what you should have seen at your last attempt in ignite. PTC we saw about 2 1/2 degrees per second, over.

SC Yeah, I believe that.

SC Buzz thinks we should have a PTC program built in the computer. He could very well be right.

END OF TAPE

COM TECH (Garble) 2 3 4 5. 5 4 3 2 1.

COM TECH 1 2 3 4 5. 5 4 3 2 1. Garble

PAO This is Apollo Control at 153 hours, 7 minutes. At the present time, we are changing shifts here in Mission Control. Flight Director Gene Kranz will be coming on to relieve Flight Director Clifford Charlesworth. The Capsule Communicator on this shift will be astronaut Charlie Duke. There will be a change of shift briefing in the news center, in the building 1 auditorium in about 10 minutes. At the present time, Apollo 11 is traveling at a speed of 4,185 feet per second. The spacecraft is about 162 700 nautical miles from the earth. During the change of shift briefing, we will take the circuit down. Record any conversation that develops with the spacecraft and play it back following the change of shift briefing. At 153 hours, 9 minutes this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control. 153 hours 49 minutes Ground Elapsed Time. Apollo 11, homeward bound, is now 161,015 nautical miles out from Earth. Velocity now 4,216 feet per second. Some 3 1/2 minutes of recorded air to ground transmissions have accumulated during the recent Change of Shift Press Conference here in Apollo News Center. Let's play that tape back now.

SC Houston, Apollo 11.

CAPCOM Go ahead, 11.

SC Rog. I was just checking the radios and how is the thruster activity coming?

CAPCOM 11, Houston. The radios are still in good shape and we are still waiting for your rates to decay. We got .03 degrees per second in pitch now.

SC Okay. We're - we're in no rush. This is a very pleasant attitude as a matter of fact, the sun is down in the LEB so it is not shining through the windows and heating the place up. We got the Earth steady out window 01. We have the Moon steadily out window 03 and of course we are locked up on the high gain, so as long as the thermal people are happy, we are happy.

CAPCOM Roger, we copy.

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead, Houston.

CAPCOM Okay, 11. We are about ready to start PTC. I would like to give you some high gain antenna angles though. We would like to operate in the react mode and if you plan on spinning up in the positive or negative direction, over?

SC We can do it either way. I had planned the positive.

CAPCOM Okay, for positive the high gain antenna setting should be pitch plus 30, yaw 270, and in react, over.

SC Understand. React pitch plus 30, yaw 270. Thank you.

CAPCOM Roger, and if - would when you are making your DSKT entries to set up for PTC, go a little slower and we will try to follow each entry from down here.

SC Roger, out.

SC Houston, 11. PTC established.

CAPCOM Roger, 11.

CAPCOM 11, Houston. We observed that PTC is variably well established here and we'll keep you posted on how it's going and your friendly white team commentator is taking over now.

SC Okay, thank all your black team.

CAPCOM That was the green team.

SC Correction, all your green team - correction green team excuse me.

CAPCOM Roger, out.

SC How could I forget. I used to be a green one.

APOLLO 11 MISSION COMMENTARY, 7-22-69, CDT 20:21, GET 153:49:00 483/2

CAPCOM Hello Apollo 11, Houston. Your white team is now on. We're standing by for an exciting evening of TV and a presleep report, over.

CAPCOM Apollo 11, Houston. Are you sure you don't have anybody else in there with you?

SC Houston, Apollo 11. Say again, please.

CAPCOM We had some strange noises coming down on the downlink and it sound like you had some friends up there.

SC Where - where do the white team go during their off hours anyway?

CAPCOM Say again.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-22-69 CDT 20:31 GET 153:59 484/1

PAO This is Apollo Control. Still no explanation, the weird noises emanating from Apollo 11, if indeed it is from Apollo 11 and it's reported from network that it's being received on the downlink at two different stations in the Manned Space Flight Network. Perhaps it will all shake out later in the mission as to what these strange noises are. We'll come back up again as conversation is resumed with Apollo 11 now 160 410 nautical miles out from earth traveling at 4228 feet per second. At 154 hours, 5 minutes ground elapsed time this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 154 hours, 53 minutes ground elapsed time. 40 hours, 9 minutes to entry. Apollo 11 homeward bound 158 378 nautical miles out from earth velocity now 4267 feet per second. We have some 3 minutes of tape accumulated over the past half hour of minor conversations with the crew of Apollo 11. We'll roll these tapes now.

CAPCOM Apollo 11, Houston. Over.

SC Roger.

CAPCOM Roger. Would you verify - We've lost comm with you for about the last ten minutes. Would you verify that the S-band track switch is in reacq? Over.

SC Negative. It's not. The last time we broke lock, we went to AUTO and I left it there.

CAPCOM Roger. We'd like you to put it in REACQ then monitor in about two minutes we'll be coming up on the high gain, would you monitor the REACQ if it doesn't take acquire manually. Over.

SC Okay. Say again the angles you'd like?

CAPCOM We'll try to switch it ourselves. Stand by on the angles.

CAPCOM Buzz, it's Pitch plus 30 yaw 270. Over.

SC Roger, I've got them.

CAPCOM Thank you.

CAPCOM Hello Apollo 11, Houston. Would you please terminate battery charge now. Over.

SC Roger. Terminating battery chargers.

CAPCOM Roger.

CAPCOM Hello Apollo 11, Houston. Any special attitude you'd like us to look at for the TV? Over.

SC I don't guess we have a requirement to (garble).

CAPCOM Roger. We have an attitude that we can get the earth out of orbit, the moon would kind of look at - I wonder if we can get both if that's what you'd like. Over.

SC A 50 degree roll attitude would probably give us that Joe.

CAPCOM Roger.

SC That's a good one because it puts the earth out window 1 and the moon out window 3 and puts the sun down the LEB so the lighting in here remains rather reconstant.

CAPCOM Roger. Well we'll just stop on

APOLLO 11 MISSION COMMENTARY 7-22-69 CDT 19:26 GET 154:53 485/2

CAPCOM the 50 roll then and we'll give  
you the word when to do that. Over.

SC Okay.

PAO This is Apollo Control. That  
completes the accumulation of air to ground communications  
by means of tape recordings on the last half hour or so.  
It's quiet right now. No conversation going on between  
Spacecraft Communicator Charlie Duke and the crew of  
Apollo 11. And at 154 hours, 57 minutes ground elapsed  
time this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 20:00 GET 155:27 486/1

PAO This is Apollo Control, 155 hours, 27 minutes ground elapsed time. Coming up now about 3 minutes away from tonight's television pass. It'll be through the 85-foot antenna at the Goldstone tracking station. The 210 foot dish out there is tied up tracking one of the Mars fly-by missions. We have some 20 seconds of tape accumulated. We'll play that back and rejoin the conversation line.

CAPCOM Apollo 11, Houston. We'll have high gain antennas out 155:30. At that time, you can turn on the TV if you desire and continue your roll around until you get 50 degrees roll. Over.

CAPCOM Apollo 11, Houston. We were going to give you the all-star game tonight, but it was rained out. Over.

SC (garble)

CAPCOM 11, Houston. We're on the high gain. You can warm up the antenna now if you like. Over.

PAO This is Apollo Control still standing by for the incoming television signal from Columbia. Still nothing but the color bar test pattern as of now. Continuing to stand by on air to ground and television links.

CAPCOM Apollo 11, Houston. We see you coming up on 50 roll. How does that attitude look? Over.

CAPCOM Apollo 11, Houston. We're ready for the TV. We're all configured. At your convenience. Over.

PAO This is Apollo Control. While we're waiting for the television pictures to come in, we have in the control room here a vase full of long-stemmed red roses, the card saying, "To one and all concerned. Job superbly done. From a moonstruck Canadian." Continuing to stand by as we wait for the pictures to come from Columbia. Here they come.

SC Houston, Apollo 11. Over.

-CAPCOM Roger; go ahead, 11. Over.

SC Are you picking up our TV signals?

CAPCOM That's affirmative. We have it up on the eidophor now. The focus is a little bit out. We see Earth in the center of the screen, and still have a little white dot in the bottom of the camera apparently, and we see some land masses in the center. At least, I guess that's what it is. It's very hazy at this time on our eidophor. Over.

SC Let me change, believe that's where we just came from.

CAPCOM It is, huh? Well, I'm really looking at the bad - at a bad screen here. Stand by one. Hey, you're right.

SC It's not bad enough (garble)

CAPCOM What?

SC I said it's not bad enough about finding the right landing spot, were you going to be at the right planet?

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 20:00 GET 155:27 486/2

CAPCOM I'll never live that one down.

END OF TAPE

SC It's not bad enough not finding the  
right landing spot but when you haven't got the right planet  
CAPCOM I'll never live that one down.  
SC We're making it get smaller and smaller  
here to make sure that it really is the one leaving.  
CAPCOM That's enough you guys.  
CAPCOM Eleven, that was a good picture there.  
SC Okay, that's enough of the moon.  
SC Okay, that's enough of the moon Charlie.  
We're getting set up for some inside pictures.  
CAPCOM Right.  
SC We've got a lot of scientists from a  
number of countries standing by to see the lunar samples and  
we thought you'd be interested to see them as they really  
are here. These two boxes are the sample return containers.  
They're vacuum packed containers that were closed in a vacuum  
on the lunar surface, sealed and then brought inside the LM  
and then put inside these fiberglass bags zippered and resealed  
around the outside and placed in these receptacles in the  
side of the command module. These are the two boxes and as  
soon as we get onto the ship I'm sure these boxes will immediately  
be transferred and delivery started to the lunar receiving  
laboratory. These boxes include the samples of the various  
types of rock. The ground mass is the soil, the sand and  
silt and the particle collector for the solar wind experiment  
and the core tubes that took depth samples of the lunar  
surface.  
CAPCOM Roger Neil thank you much for that  
description. We've got a pretty dark picture down here  
could you set your F-stop. We'd like to have it, see if you  
can open it up a little bit, over.  
SC Okay our monitor showed that to be  
very bright.  
SC We're down here between, well around  
F4 which we thought would be plenty right, we'll wind it up  
some more.  
CAPCOM Well we'd appreciate it. It's pretty  
dark on all our monitors here.  
SC Okay, fine.  
CAPCOM It's looking a lot better now, Neil.  
CAPCOM There's Buzz.  
CAPCOM 11 Houston, we have an excellent picture  
now, over.  
SC Okay how do you read me, Charlie.  
CAPCOM 5 by now, Buzz, over.  
SC Okay. The more mundane affairs, now  
that we've touched the moon, I'd like to trace through a little  
bit for you the developments that have taken place in the

SC food department. I'm sure you've already seen the drink container. A little later Mike will show you how the water gun operates with its new filter to take out hydrogen. Essentially this water gun is put in this hand and filled up this bag with water and the tang then dissolves in the water and this ends of the - out feeding. Likewise we have other foods that are more solid nature. You can probably see this shrimp cocktail meal. This afternoon while the two of us had salmon salad. Another early development was the use of bite size food.

CAPCOM Eleven, Houston, Buzz, you're breaking up badly, will you check your vox, over.

SC Roger, how am I coming through now, Charlie.

CAPCOM You're very clear when you come through. It's just that your vox is not keying at every word, over.

SC Okay.

SC These bite size objects were designed to remove the problem of having so many crumbs floating around in the cabin so they designed a particular size that would be able to go all into the mouth at once. I think since all of our experience we've discovered that we could progress a good bit further than that back to some of the type meals that we have on earth. As a matter of fact on this flight we've carried along pieces of bread and along with the bread we have a ham spread, and I'll show you, I hope, how easy it is to spread some ham - while I'm in zero "G". - I think we've discovered that it is quite easy to - - you're all very familiar with.

CAPCOM Apollo 11, Houston. We notice your roll rate increasing. Will you please see if you can bring that down to about 04 so we'll be losing a high gain shortly, over.

SC You can also use zero gravity to demonstrate many things that we've all learned in school. I'd like to demonstrate briefly how easy it is to explain the action of the gyroscope. We know that according to the equations of motion that we would expect that once this is given a spin, and has a spin axis in this direction, if we give it a particular torque, I'll do this by pushing my hand against it in this fashion once its spinning, by the equations we can predict, if as I put this torque on it, it will in fact -

END OF TAPE

SC and begins to in this fashion conceits spinning. By the equations, we can predict that if I put this torque on it, it will in fact rotate this direction. Let's see how well this works out. See even if I apply the torque this way, its rotated this way.

SC Too close isn't it?

CAPCOM ll, Houston. It's a pretty good demonstration.

SC Houston this next is a little demonstration for the kids at home, all kids everywhere for that matter. I was going to show you how you drink water out of a spoon but I'm afraid I filled the spoon too full and if I'm not careful, I'm going to spill water right over the sides. Can you see the water slopping around on the top of the spoon kids?

CAPCOM That's affirmative ll.

SC Okay, well as I said, I was going to tell you but I'm afraid I filled it too far and its going to spill over the sides. I'll tell you what. I'll just turn this one over and give me the water and start all over again. Okay?

CAPCOM Okay.

SC And you can see, up here we don't know where over is. One up is as good as another and that really is water, I tell you.

SC That's really not the way we drink. We really have a water gun which I'll show you. Here's the water gun, this cylindrical thing on the end of it is a filter with several membranes. One allows water to pass but not any gas; the other allows gas to pass but not any water so by routing the gaseous water which comes from our tank through the filter we're able to drink purified water without the gas in it, filtered water. And of course all we do to get it started is pull the trigger. It's sort of messy. I haven't been at this very long. It's the same system that the Spaniards used to drink at a winestand at the bull fights, only I think it'd be more fun.

SC We'll be seeing you kid.

CAPCOM Thank you from all us kids in the world, here in the MOCR, who can't tell the earth from the moon.

SC Roger. Stand by. We'll get you that (garble).

CAPCOM Looks like you need a wine skin up there, Mike?

SC That'd be nice.

SC Okay.

CAPCOM 11, Houston. -

SC You want a picture now, Houston?

CAPCOM That's affirmative. I refuse to bite on this one though. You tell us.

SC Okay. This should be getting larger and if it is the place we're coming up to.

CAPCOM Roger.

SC No matter where you travel, it's always nice to get home.

CAPCOM We concur 11. We'll be happy to have you back.

PAO This is Apollo Control. Still up live with the air to ground circuit to Apollo 11 homeward bound. Now in the passive thermal control mode, or barbecue mode, Charlie Duke is going to make another call to the crew. Let's listen in, in a moment. He's discussing with Flight Director Deke Frank, who tonight is spelling Gene Kranz on this shift, although Gene is here. They're discussing some adjustments to the passive thermal control mode. Apollo 11 has left the moon some 53 666 miles behind it. And relative to the moon, Apollo 11 is traveling now at 4306 feet per second. Continue to monitor air to ground here till the crew settles down. They're not scheduled to go into their rest period until about another 4 hours from now.

CAPCOM Apollo 11, Houston. We were curious to see if there was any excess moisture up around the tunnel hatch area as we saw on 10. Over.

SC It just so happens that's what we were talking about now. There is a little bit of dampness around the outside edge of the hatch but very, very slight amount. We've got a hose up there that - -

END OF TAPE

SC outside edge of the hatch, but very, very slight amount. We've got a hose up there that we're hoping will sort of help keep it a little bit dry.

CAPCOM Roger, Mike. Thank you much. Have you seen any more water collecting on the AFT bulkhead? Over.

SC No, we haven't, as a matter of fact. It's been dry in that area since we got rid of that last time.

CAPCOM Rog. Thank you.

SC Apollo 11 is back in PTC attitude. Standing by for thruster quieting.

CAPCOM Rog, we see that. Thank you much, Mike.

PAO This is Delta Launch Control. We have postponed the launch of the Delta vehicle tonight. The launch of INTELSAT 3, 24 hours. The reason for this postponement is to examine the second stage propellant ground equipment. There is a slight chance that the acid used in the second stage for an oxidizer inhibited red fuming nitric acid, could have contained an excessive level of contaminants. This possibility is the most that there is a desire to make the examination. During fueling today, it was noticed that the transfer of the inhibited red fuming nitric acid took longer than expected, or longer than normal. In examining the ground equipment, it was found that a filter element had dislodged and had traveled approximately 2 feet into the line. There is need now to insure, that in fact, the displacement of this filter was what caused the slowdown and also a need now to analyze the IRFNA, or inhibited red fuming nitric acid to insure that no contamination is evident. The launch has been rescheduled for 24 hours from now, or 24 hours from 10:00 PM tonight. This has been cleared with the range. We have the same launch window tomorrow night. 10:00 PM to 11:10 PM. This is Delta Launch Control.

PAO This is Apollo Control. Apparently, there will be little conversation in the next half hour or so. Apollo 11 now 155,000 as you were - Yes, 155,906 nautical miles out from earth. Approaching at a velocity of 4,316 feet per second. And at 156 hours 6 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. After first saying that there would be very little conversation, it seems there's quite a flurry of conversation between the ground and Apollo 11. Let's play back tapes and catch up and go live.

SC Houston, Apollo 11. Could you get a little summary of the evening news for us?

CAPCOM Yes, sir. We'll have it for you momentarily. Also, a little flight plan update, Mike. On page 3-113, you can delete the O2 fuel cell purge. Over.

SC Will do.

CAPCOM There is a flurry of activity in the PAO site, for the evening news.

SC Okay.

SC How's the weather down there? You got any rain?

CAPCOM Roger. We've been having a little bit, thunderstorm type the last couple of days. We had a pretty good rain today, and it's been overcast. A slow storm system has been moving through the area in the last couple of days, and primarily evening and afternoon thundershowers..

SC Roger. We were watching a few clouds in your area through the monocular along the Texas Gulf Coast this afternoon, and we also noticed there were clouds over Baja California which is a little bit unusual.

CAPCOM Roger. Thank you for the weather report. We can't quite see that far. It seems to have cleared up outside now according to some of the people coming in. It's a constant overcast. The marker here is a little hard to see outside.

SC Yes, we also noticed it was a little overcast out over - in the Antarctic Ice Cap too.

CAPCOM Roger. It's apparently raining pretty hard up -

SC I bet they're running out to the ship.

CAPCOM (Laughter)

SC He may know that but he doesn't even know whether his grass is wet or dry.

CAPCOM It's apparently raining fairly hard up in Washington where the all-star game was to be played tonight. They started out on it and then it was rained out, and they called it off.

SC They really need a roof on their stadium and they can catch all those flies.

CAPCOM Roger.

SC In the rain.

COM TECH B. J.

SC Hey, Charlie, what's the preliminary outlook on the weather in our recovery area?

CAPCOM Stand by, Buzz. It looks pretty good.

CAPCOM as far as I could tell. We got the - over the tropical convergence line there - there's a few clouds shown on the weather map I'm looking at here, but nothing of significance. Right now - Stand by. Let's see, right now the mid, yes, the MPL - we've got 3 clouds of scattered, visibility, 10, waves at 3 feet at the present water. I don't think there's anything forecast to be of significance. There are a couple of - Flight just informed me that what I just gave you was the forecast. There are a couple of tropical storms in the - well, not in the area of landing but in the Pacific. A storm called Claudia which is north - correction - about east of Hawaii. It's going northwest and vicinity. There's one called Viola, which is out over Guam, and so they aren't any factor at all. Looks like it's going to be real nice for recovery. Navy called up those special COMM C's for you guys from up there on the Hudson.

SC Well, we might need it. We'll get a look at it tomorrow, I guess. We ought to be given a pretty close eye.

CAPCOM Roger.

CAPCOM 11, Houston. The Retros were wondering if you could fill us in on any non-nominal storage that we have onboard. Just location and weight is about all to answer to that. Over.

SC Roger. We'll do some work on that and let you know, Charlie.

CAPCOM Thank you, sir.

CAPCOM And, Apollo 11, Houston. Would you please place 02 tank 1 heater to AUTO? Over.

SC AUTO it is.

SC Houston, Apollo 11.

CAPCOM Go ahead.

SC What we'll do Charlie, tomorrow, is go through and reconfigure our storage as closely as possible to nominal. Some things that will not be nominal are as follows: the EVA visors were brought back in the command module and we have not yet found a home for them. We'll let you know where they go. In addition, there's about 5 pounds of miscellaneous weight from the LM in Compartment Able-8, and it's taking the place of the LCG's which we moved from A-8 into stoop bag. We got rid of one miscellaneous trash bag, mostly old photographing and also old underwear and helmet protective advisors from the CMP's. We left all that with Eagle. And those are about the only off nominals we have.

CAPCOM Thank you very much. We appreciate it.  
Out.

SC Roger.

END OF TAPE

CAPCOM Apollo 11, Houston. We got the rates looking copacetic you can go ahead and initiate PTC, over.

SC Thank you.

CAPCOM And Buzz, we're still not getting any data from your EKG. It looks like the only way that we're going to be able to get any is if, at your convenience, you would take your, change out your EKG lease, which are the center ones that are connected to the blue pin and there's a spare one in the medical box, over.

SC Roger, how many did you want me to change?

CAPCOM Just the center one. I'll get the right nomenclature from the dot. Stand by. It's called the sternal EKG, which is a three center one, and it's got, they lead into a, into the blue strings lead ones, over.

SC Okay, there's three of them, is that right.

CAPCOM That's affirmative.

SC And you want me to change all three.

CAPCOM That's affirmative and there all hooked together from the PITCH I'm looking at and they go into the center belt, signal conditioner and it's got the blue strained relief on it.

SC Yea I checked the connectors at both ends on that. I don't guess we have a spare signal conditioner or anything like that, do we.

CAPCOM No we do not.

SC Well I can show you my heart's still working.

CAPCOM We believe it.

SC Charlie, what we suggest here is, before we start that, turn our two suit powers off and plug his blue lead into my blue signal conditioner and see if we can get his signal through my signal conditioner, okay.

CAPCOM Roger, that's a good suggestion Neil. We concur, over.

SC Okay, Charlie we're chancing it and lets see if you get any EKG signal on the CDR at this point.

CAPCOM Roger, stand by.

CAPCOM Eleven, Houston, we get some data but its got the same problem that we had through Buzz's signal conditioner, so apparently the lead is broken and we'd like you to change it out if you could, over.

SC Okay.

CAPCOM Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 156:30, CDT 21:03 492/1

SC Houston, Apollo 11.  
CAPCOM Go ahead, sir.  
SC Roger. I think the problem  
was that the center lead had dried out. After I had put the  
new one on, and I'll see how that works. Over.  
CAPCOM Rog.  
SC I can't tell you how good it  
feels to get on them.  
CAPCOM Yeah, I can imagine.  
SC Houston, Apollo 11. Houston,  
Apollo 11.  
CAPCOM Go ahead, 11. Over.  
SC Roger, how do you read me EKG now?  
CAPCOM Stand by. We'll let the docs  
look at it. Buzz, we're on low bit rate. We'll get you on  
a high gain momentarily and we'll let you know then. Over.  
SC Okay, I got my high gain antenna  
coming out.  
CAPCOM Roger. Just leave on react.  
We'll get you.  
CAPCOM Apollo 11, Houston. Buzz, your  
EKG looks good now. The doc said thanks a lot.  
SC Okay, they're welcome.

END OF TAPE

CAPCOM Apollo 11, Houston, based on our sighting since the midcourse we're showing a gama of -6.57. This is preliminary though and we think that after some more tracking it should come on in, we could tweak it right on to the quarter. It's just about in the center of quarter, everything's looking fine. We'll have you a entry pad in a couple of hours before you go to sleep, and from our friends in public affairs a few headlines, other than your flight. Your still dominating the news, however there are some other things of interest for you. As I mentioned earlier, the all star game was rained out, it's going to be played tomorrow, however President Nixon will not be able to see it as he had planned. We'll keep you posted on results. And also the weathermen are going to be good to you. Our forcast is, looks like it's holding good for the recovery area, it should be real fine out there. President Nixon as he prepares to fly out to greet your return says that within 31 years man will have visited at least 1 other planet having some form of life. In the year 2 thousand we, on this earth, will have visited new worlds where there will be a form of life, he told 2 thousand foreign exchange students at the whitehouse. Before he left for his week long trip the president sent congress his proposal for reorganizing the interstate commerce commission. He also conferred with chairman Earl Wheeler of the Joint Chiefs of Staff on his return from Viet Nam, and the launch of Intelsat was scrubbed and has been rescheduled for 10 PM Eastern Daylight time on Wednesday. The second stage fuel ground support system shows some contamination. And back in Washington, the House Ways and Means committee agreed to tax changes affecting oil companies, banks and utilities that could add nearly 2 billion a year to federal revenue. And also today NASA announced that it will launch a large orbital workshop in 1972, with a cutdown version of the Saturn 5. And your television pictures attracted a lot of interest. They were shown live throughout just about the whole world, and, but we're expecting hundreds of telephone calls from mothers all over the world complaining that their youngsters are trying to drink milk from spoons, thanks to you, Mike.

SC I take it all back.

CAPCOM You need more practice.

PAO This is Apollo Control. Things are beginning to quieten down aboard Apollo 11 as they get nearer their sleep period. There probably won't be too many more exchanges between spacecraft communicator Charlie Duke here in Mission Control and the crew aboard Columbia. Entry countdown clock now showing 37 hours 53 minutes this may be refined a

PAO few times between now and splash time, or entry. Apollo 11 now is 153 thousand and 80 nautical miles out from earth approaching at 4 thousand 3 hundred 73 feet per second. And at 157 hours 10 minutes ground elapsed time, this is Apollo Control.

PAO This is Apollo Control, 158 hours, 1 minute ground elapsed time. There's been a certain amount of conversation between Charlie Duke here in Mission Control and the crew of Apollo 11. We'll play back the accumulated tape at this time and then rejoin the conversation when it does resume on a live basis. Let's roll the tape now.

CAPCOM Hello Apollo 11, Houston. Buzz you brought the surgeon out of his chair. We see you exercising. Over.

SC Thank you.

CAPCOM Exercising. Is that correct Buzz?

SC Yes Buzz is.

CAPCOM Roger. We've got his heartbeat way up.

SC (Garble) I have seen.

CAPCOM Yes. That's what we thought.

SC Right - you sure got a busy one tonight, huh Char?

CAPCOM Say again Mike. Over.

SC I said the white team really got a busy one today, huh?

CAPCOM Oh boy. We're really moving along here with all this activity. Can barely believe it.

SC What are you doing? Sitting there with your feet up on the console doing drawing?

CAPCOM You must have your x-ray eyes up. You still can see a long way.

SC We're watching you as well, you know.

CAPCOM Your right.

SC You people in the viewing room and the boys in the trench.

CAPCOM We've got 8 in the viewing room and let's see, about 6 in the trench right now. And this is the highlight of the day, Buzz's exercise for the surgeon. 11 you copy. Over.

SC Roger 11.

CAPCOM Neil has the highest heartbeat ever seen on a manned spaceflight. We just went low bid rate. The surgeon is about to die.

SC I measured it up here to be 247.

CAPCOM Boy, that's super.

SC The units on that furlong per fortnight.

CAPCOM Roger. We copy that. EECOM says if you keep that up, you're going to have to change your CO2 canisters.

SC You were going to make me do that in another 45 minutes anyway.  
CAPCOM That's true.  
SC That's why I waited until Monday, I was really looking forward to that.  
CAPCOM Thank you ll. We appreciate you turning that off.  
SC Charlie, could you copy our music down there?  
CAPCOM Did we copy what, Neil?  
SC Did you copy our music down there?  
CAPCOM Roger. We sure did. We're wondering who selected - made your selection?  
SC That's an old favorite of mine. It's an album made about 20 years ago, called Music out of the Moon.  
CAPCOM Roger. It sounded a little scratchey to us, Neil. Either that or you're tape was a little slow.  
SC It's suppose to sound that way.  
SC It sounds a little scratchey to us too, but the czar likes it.  
CAPCOM That's what we figured, he and his 40,000 votes.  
SC Well, the answer we got looks like about 150,000 out now.  
SC It's getting appreciably larger now. It's getting more like..the world.  
CAPCOM Roger. I'm looking at the right side of the screen this time.  
SC How's everything going on the - say again, Charlie?  
CAPCOM Roger. I'll never hear the last about that Earth, Moon business on the TV there and I was just saying that I was looking at the right side of the board here so your going towards the earth. What were you going to say Mike?  
SC You'll have a lot of fun at the press conference after this shift, then, won't you?  
CAPCOM It's 2:30, everybody will be asleep. I going to sneak off through the back way.  
SC I was just wondering how everything is going at the homefront. Are all our kids in one piece.  
CAPCOM Roger. Sure are. Everything doing fine. All the gals are having a little party tonight as far as I know.  
SC Roger. Glad to hear it.

END OF TAPE

CAPCOM Apollo 11, Houston. I was just reading some of the transcripts of earlier today about the earlier PTC that we attempted, and when you keyed into Verb 24 and did the two ENTERS, it took off on you. I think we got a story on that if you'd like to listen to why it had such a high rate, Mike. Over.

SC Yeah, I'm all ears.

CAPCOM Okay, I think it would be better if you got your checklist out on 97 and we could walk you through it and that way I could probably get the story straight. Over.

SC Okay, I got it.

CAPCOM Okay, Mike, what happened is, you know, you were sitting there monitoring Verb 16, Noun 20 and at step 7 you went into Verb 24, Noun 01 and keyed in the EGRESS and then information information and on the final enter of that 35400 enter, right after that, that did put you back into the 16, Noun 20. Then when you did the Verb 24 ENTER, you were really entering the information in the actual CDU's, and when you got the two entries in in register 1 and 2, it was an instantaneous change in the actual CDU's, and the CMDAC looked at that and saw what it thought it had - My gosh, I got a 600 degree per second rate, and it turns on the jets to try to take that rate out, and the rate filters that it's looking at - well, the rate is looking at its filters, so it doesn't really sense the actual rate until the thing is already built up and then it starts reading the rate filters and it says - well, I really didn't have 600 degrees, so then it turns it off and tries to slow it down, but until that happens, and it is some time lag and that's why the rate was building up. The jets were on and they were going to stay on due to that instantaneous 600 - suspected 600 degree per second range. Over.

SC Okay, I got you.

CAPCOM Roger.

SC Man.

SC Hey, Charlie, you saying that for a short period of time, he actually loaded Noun 20 with some value other than what's being read by the CDU's?

CAPCOM I think I got, Buzz. That's affirmative. But when he did that second Verb 24 the noun was 20, so when he did the 3175 and then a 002 ENTER, what he actually did there was load the first two actual CDU locations, and the computer looked at it and the DAP looked at it as an instantaneous change in the actual CDU's. Stand by on your comments. We're switching antennas.

SC Okay.

SC Alright.

CAPCOM 11, Houston. We got you back now on the high gain. Did you copy all that buzz? Over.

SC Yeah, I think so. I - I thought that noun 20 was one of those that you can never load from the DSKY and

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 158:11, CDT 22:43 495/2

SC and that still may be. Maybe you would load it just for the short period of time, and then when the counters read the gimbal angles, then they changed it back to what they actually are, but in the meantime, the DAP is different numbers. Is that right?

CAPCOM Well, I got it. Guy was telling me that you can actually load those ACDUs, the actual CDUs, but we're checking on that. Over.

SC Okay.

CAPCOM 11, Houston. Buzz, the word from the back room is that you can actually load the noun 20, but you should not.

SC Yeah, I got that. Thank you.

CAPCOM You're welcome.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/22/69, GET 158:26, CDT 22:58 496/1

CAPCOM Apollo 11, Houston. We got a recommendation for you on your stowage of the LM EVVA's. Over.

SC Go ahead.

CAPCOM Okay, we'd like - the span guys say it look - they think that one would go on the helmet that you're going to have in B1, and you could put the other one on Mike's helmet which will be in the sleep restraint. Over.

SC I doubt if it will fit on that one in B1. The other one might - might go into sleep restraint. We've got them in our helmet bags, and I guess we're going to have to keep the helmets in the helmet bags. and the LM EVVA's in the LM EVVA bags.

CAPCOM Roger.

SC I've been thinking maybe they ought to stay filled up. It won't hack, Charlie, with a cover. I tried it already.

CAPCOM Okay. Fine. We weren't sure of that. It was just a suggestion. We thought we'd let you check it out. Sounds like you've already done that so I guess whatever you can come up with, just let us know.

SC Okay. There's no problem. We'll let you know what we end up with.

CAPCOM Roger.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 00:20 GET 159:49 498/1

PAO This is Apollo Control, 159 hours 49 minutes Ground Elapsed Time. Apollo 11 crew is giving their final report prior to their starting their 10 hour rest period. We've got a little accumulation of tape, then we'll join live. Let's roll the tape now.

SC Hello, Houston. Apollo 11.  
CAPCOM Go ahead, 11. Over.  
SC Okay. Crew status report. Radiation  
CDR 11020, CMP 10022, LMP 09024. No medication.  
CAPCOM Roger. Copy. And, Neil, we got -  
we'd like your onboard readouts of batteries and RCS. Over.  
SC Okay, Charlie. Ready to copy.  
CAPCOM Roger. Go ahead. Over.  
SC Okay. Bat C - Pyro Bat A - Pyro Bat B  
37.0. RCS A, 51, B, 63, C, 63, D, 59. Over.  
CAPCOM Thank you. Copy all that, Neil. And  
we got a entry pad if you're ready to copy. Over.  
SC Houston, Apollo 11. Ready to copy. Over.  
CAPCOM Roger, Buz. In the entry pad MPL, we're  
starting with roll 05, 35 - correction - 359 152 001. PET  
194 46 03 267 plus 1102 minus 17203 068 NOUN 60 36194 656 11894  
36275 1950303 0027 NOUN 69, all four lines are NA. Picking up  
with B zero: 400 02 09. REP is blackout 00170338, 0820.  
Sextant star 02 09 45, 149. Foresight star is 45 theta. That's  
45 theta. Up 315 right 35. Left vector up. Any comments?  
This entry pad assumes no mid-course six. And for your information,  
looking at it right now, based on all the tracking we got, that  
maneuver would only be a tenth of a foot per second. So, we'll  
probably skip it. We'll let you know more about that later.  
Okay, your horizon check at EI minus 30 minutes, DET at 194 33 03.  
Give you a pitch angle of 298 T. The DDC, you back up a line.  
You set stars for the entry REFSMAT are Deneb and Vega 079 234  
340. Standing by for your read-back. Over.  
SC Roger. Lunar entry MPL 359 152 001,  
194 46 03, 267 plus 1102 minus 17203 068 36 194 656 11894,  
36275, 195 03 03, 0027, 4 NA, 400, 0209, 0017, 0338, 0820,  
02 0945, 149, 45 theta. Up 315, right 35, up. Entrance no  
MCC 6. Horizon at EI minus 30, 194 33 03, and pitch 298. Set  
stars Deneb and Vega 079 234 340. Over.  
CAPCOM Roger. Very good read-back, Buz, and  
for your communication setup for tonight's sleep, we'd like  
OMNI to OMNI. Stand by.  
CAPCOM Apollo 11, Houston. If you didn't copy  
that, Buz, it was a good read-back on the pad. We've got a  
clock update for you that we'll have to you as soon as we get  
it out to the site. We're in the process of handing it over  
to Honeysuckle, and will be a couple of minutes. Over.  
SC Okay. Is that the computer clock?  
CAPCOM We'll call you. You can stay Block

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 00:20 GET 159:49 498/2

right now. We'll give you a call.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/22/69 CDT 00:30 GET 159:59 499/1

CAPCOM Hello Apollo 11, Houston. Will you please give P00 in excess. We've got a clock update for you.

SC Go ahead Charlie. We're P00 in excess.

CAPCOM Roger.

CAPCOM Apollo 11, Houston. We've got the loading, you can go back to block. Over.

SC Roger. Thank you.

CAPCOM Apollo 11, Houston. One final thing. We'd like you to select your OMNI to OMNI, OMNI A to BRAVO, high gain track manual and Beam Y. Your angles are 270 and yaw pitch minus 50. Over.

SC Roger. 50 and minus 70.

CAPCOM The angles Buzz were yaw 270 pitch minus 50. Over.

SC Okay, yaw 270 pitch minus 50.

CAPCOM That's right. And Apollo 11 it's goodnight from a sleepy White Team. Over.

SC Roger. Thank you very much. We're not as sleepy tonight as we were last night.

CAPCOM Yes, I guess you guys were pretty tired last night after that busy day.

SC After that experiment, I can't even find the chlorine.

PAO This is Apollo Control. Crew of Columbia at this time should be getting ready to start their 10-hour rest period after having been tucked in by spacecraft communicator Charlie Duke here in mission control. At 160 hours 10 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 2:00 GET 161:28 500/1

PAO This is Apollo Control, 161 hours, 28 minutes ground elapsed time. The crew of Columbia is now in a 10 hour sleep period. The official time they went to sleep according to the surgeon, Dr. Cannon Biers is 160 hours, 42 minutes ground elapsed time, almost an hour ago. The Columbia now is 141,369 nautical miles out from Earth, approaching at a velocity of 1,628 feet per second. Entry clock now showing 33 hours, 34 minutes to entry or 400,000 feet altitude. Here at Mission Control the black team of flight controllers headed up by Glen Lunnie is moving in to take over for the next eight hours or so. Spacecraft communicator, Charlie Duke will be replaced by Ron Evans, who just entered the room. And at 161 hours, 29 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 162:28 CDT 3:00, 501/1

PAO This is Apollo control at 162 hours, 28 minutes. The Apollo 11 spacecraft Columbia is 138 674 nautical miles from earth approaching at a velocity of 4692 feet per second. Spacecraft weight, 26 000 pounds. Flight director Glen Lunney has just completed a status check with all of the flight controllers here, has gotten very good reports from all of them. The retrofire office here reports that on the present trajectory, Columbia's entry angle is minus 6.56 degrees. The nominal entry angle is minus 6.51 degrees. Retro expects entry velocity to be 36 194 feet per second. He calls these entry conditions excellent. The flight dynamics officer says that tracking is looking very good. Guidance navigation control officer reports the passive thermal control stable, operating very well. Reaction control system looking very good. E COMM, the electrical environmental communications office reports cryogenics well balanced. The environmental control system looking good. All of the antennas and the power status in good shape. And, the flight surgeon reports the crew sleeping soundly. His data indicates all three crewmen were asleep by 160 hours, 42 minutes, and he reports they have taken no medication. In recovery reports, the weather looks very good in recovery area, and all conditions there are ready for a successful recovery. This is mission control at Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 4:00 GET 163:28 502/1

PAO This is Apollo Control at 163 hours 28 minutes. Apollo 11 is 135,920 nautical miles from earth. Velocity 4,758 feet per second. The crew's been asleep almost three hours now. All systems still performing well. This is mission control Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 5:00 GET 164:28 503/1

PAO This is Apollo Control at 164 hours 28 minutes. Apollo 11 is 133 131 nautical miles from Earth, approaching at a velocity of 4827 feet per second. Crew is asleep. Performance of all systems continues to be normal. We're 30 hours 34 minutes 37 seconds away from entry of Apollo 11 into the Earth's atmosphere. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 6:00 GET 165:28 504/1

PAO This is Apollo Control at 165 hours, 28 minutes. Apollo 11 is 130,306 nautical miles from the earth. Velocity 4,900 feet per second. Crew is still asleep and all systems are still performing well. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 7:00 GET 166:28 505/1

PAO This is Apollo Control at 166 hours 28 minutes. Apollo 11 is 127 431 nautical miles from the Earth. Velocity 4975 feet per second. Crew still sleeping, all systems still normal. The weather bureau's space flight meteorology group reported today that weather conditions for the landing of Apollo 11 tomorrow expected to be acceptable. Some showers have been reported near the landing area, but these are expected to move westward, leaving the recovery area with partly cloudy skies, east-north easterly winds 10 to 15 knots and 4-foot seas. Although tropical storms will not affect weather in the landing area, the Apollo 11 crew should get a good view of the tropical storm Viola, located in the western North Pacific, and also the remains of the tropical storm Claudia, located southeast of Hawaii. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, CDT 8:00, GET 167:28, 506/1

PAO This is Apollo Control at 167 hours, 28 minutes. Apollo 11 is 124 520 nautical miles from the Earth approaching at a velocity of 5055 feet per second. All still going well aboard Apollo 11 maintaining a stable passive thermal control mode, nose pointed toward the Earth, rotating 3 revolutions per hour. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 9:00 GET 168:28 507/1

PAO This is Apollo Control at 168 hours, 28 minutes. Apollo 11's distance from the earth is 121,505 nautical miles, velocity 5138 feet per second. All systems are performing well. The crew is still asleep. Clock here in the Control Center shows 26 hours, 34 minutes, 37 seconds until entry into the earth's atmosphere. This is Mission Control, Houston.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 10:00 GET 169:00 508/1

PAO This is Apollo Control at 169 hours 28 minutes. Apollo 11 is 118 542 nautical miles from Earth approaching at a velocity of 5225 feet per second. The crew is still asleep, the performance of all systems continues to be normal. Midcourse correction number 6, which was scheduled for an elapsed time of 172 hours, has been canceled. The trajectory is such that it will not be required. From the Manned Space Flight Network we have a contribution to the Apollo 11 mission from a 10 year old boy in Guam. The Guam tracking station is receiving telemetry from this mission and had a problem with one of its antennas - a bearing. The bearing was replaced with the assistance of a 10 year old boy named Greg Force who had an arm small enough that he could work through a 2 and a half inch diameter hole to pack the new bearing. We're now showing entry interface with the Earth's atmosphere 25 hours 33 minutes 30 seconds from now, and the Green Team of flight controllers, led by Cliff Charlesworth, is now taking over from Glynn Lunney and his Black Team of flight controllers. This is Mission Control Houston.

end of tape



PAO This is Apollo Control at 172 hours, 20 minutes. During the press conference we established contact with the crew. Capsule Communicator Owen Gary had put in a call at 171 hours about 10 minutes after the surgeon reported biomedical data showed all three crewmen awake. Neil Armstrong responded and we have received a status report from the crew and we also passed up the information, preliminary information, that they will use in the reentry tomorrow and gave them a weather report for the prime recovery area in the Pacific, the landing zone. We will play back about 12 minutes of taped conversation that we have accumulated to date and then stand by for any further live comments from the spacecraft.

SC - had then yet. Over.

SC - eyeballing the (cut out)

CAPCOM 11, Houston. Got your signals loud and clear. How are things this morning? Over.

SC Do you read us, Owen?

CAPCOM Roger. Loud and clear, 11.

SC Okay. Everything seems to be all right here. So far we haven't been looking in the contents yet. We have been spending our time looking outside (cut out).

CAPCOM Roger, 11. You are breaking up just a little bit there, Neil. Your signals are loud but you are breaking up occasionally. Your spacecraft all looks good here from the ground. We noticed you stirring around the cockpit and thought we'd give you a call. Over.

SC Stand by.

CAPCOM Houston. We do have a few items for you here, entry pads, consumables and so forth. After you have had a chance to get organized, whenever you are ready to start on a few of these items, we'll read them up to you. Over.

SC Okay. Stand by.

SC Go ahead, Owen, I've got the book now ready to copy.

CAPCOM Okay, Buzz. On your flight plan items a few updates first of all. We have cancelled the midcourse No. 6. Just remain in PTC. I'll give you a little more time this morning. Second item on the flight plan is we're ready for a Bat B charge anytime you want to put it on the line and third item we'd like a waste water dump a little differently this time. We'd like to do it on our marks on the ground. The PTC is a little bit ragged and we'd like to make the water dump at a time which we think will hold it in its proper configuration

CAPCOM so it looks like we will have a desirable opportunity coming along in between 15 and 20 minutes and on our mark we would like to have a waste water dump-down to about 40 percent. I will give you a more accurate level for the water dump a little later. Over.

SC Roger. (Inaudible)

CAPCOM Roger, 11. Stand by just a moment here until we get out of the no-position on the antenna.

CAPCOM 11, Houston. We are on the OMNI DELTA now and I think we can read you better. Did you get all those first three items on your flight plan update? Over.

SC Okay. Midcourse correction cancelled, Battery B charge and word on your call.

CAPCOM That's right, Buzz, and the last item here we do request that we do a P-52 even though we are not doing the midcourse correction and we suggest you get to that after the waste water dump has been completed. We also have a state vector update for you, if you can give us a P00 and ACCEPT. Over.

SC Okay. you have the DSKY now.

CAPCOM Roger. We'll be sending that up, and I will give you your consumables update now. It is for a time of 170 hours, your RCS total is minus 3.5 percent, Alpha is minus 14.5, BRAVO Plus 7, CHARLES minus 4.5, DELTA minus 3, hydrogen total is minus 1 and your oxygen total is plus 24. Over.

SC Roger. Copy those. And outboard readouts is D is 69, C is 73, D is - let me say it over again. Okay. A is 51, B is 62, C is 63 and D is 59. Over.

CAPCOM Roger, 11. Copy those and we've checked them out on the ground also. One correction to my last transmission. We would like that P-52 prior to the waste water dump which is coming up in about 30 minutes now. Will that be possible. Over.

SC Yes, Owen, we'll take care of that.

CAPCOM Roger. And if you are ready for an entry pad, I'll read that up to you also, 11.

SC Ready to copy.

CAPCOM Okay. Entry pad is area midpack 359153001 1944603 267 plus 1102 minus 17203 06736194 65511875 36275 1950303 0028 DL at VL all four are not applicable, D 0, 400 0210 0018 0338 0821 442932 380 fore sight star is Scorpio Vega, up 314 Right 34 (garble) vector up. Comments, entry data assumed no midcourse

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 12:52 GET 172:20 511/3

CAPCOM maneuvers. Your earth entry minus 30 minutes horizon check 194 plus 33 plus 03. Your PITCH is 297. This assumes an entry REFSMMAT. Your GDC align stars are Denib and Vega. ROLL PITCH YAW is 078233 340. Readback. Over.

SC Roger. Midpack entry pad 359153001 2944603 267 plus 1102 minus 17203 06736194 65511875 362751950202 0018 DL and VL at AGS, 400 0210 00180338 0821 442932 380, fourth guide DELTA, Scorpio Vega, up 314, Right 34, up. No midcourse correction horizon PI minus 30

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-23-69, GET 172:30, CDT 13:02 512/1

SC About the midcourse correction,  
horizon TI minus 30, 1943303, pitch 97, deneb and vega 078233340.  
Over.

CAPCOM 11, Houston. That's roger, copy.  
11, it's also your computer. Go back to block.

SC Roger.

SC Crew status report is 8 1/2, 7,  
and 8.

CAPCOM 11, Houston. Roger, Neil. 8 1/2,  
7, and 8 for your crew status. 11, Houston. Your P52 looks  
good here on the ground, and we are now estimating that water  
dump will occur along about 171 plus 40, and we'd like for you  
to dump to about 45 percent. This should let you arrive at  
earth interface with just about a full load of waste water.  
Over.

SC Okay, 150, 140 approximately.  
40 percent.

CAPCOM 11, Houston. We'd like to advance  
the time on that water dump to about 171 plus 30 just after  
we reacquire on the next omni, and have I mentioned that it'll  
be down to about 45 percent is the new quantity. Also, we're  
standing by for your CM RCS injector temperature readout. Over.  
Apollo 11, Houston. I'm not certain you copied my last  
transmission as we were just in the process of switching  
omnis. We'd like to advance the time on that water dump until  
about 5 minutes from now. We'll give you a precise mark on  
the time to start the dump, and we are standing by for your  
readout on your CM RCS injector temperatures. Over.

SC Okay, Owen. We're standing by  
for your mark, and stand by for the readout.

CAPCOM Roger.

SC Houston, Apollo 11. Are you  
ready to copy injector temperatures? I'll read them in volts.

CAPCOM That's affirm. Go ahead, Mike.

SC Okay, 2-4 is reading 4.7 volts.  
2-5 is reading 4.8 volts, 1-2 is reading 4.8 volts, 1-4 is  
reading 4.8, 1-6 is 4.5, and 2-1 4.8. Over.

CAPCOM 11, Houston. Roger. Those - I  
got them all. Apollo 11, Houston. We're ready for you to  
start your waste water dump at this time. Over.

SC Roger, dumping.

CAPCOM Apollo 11, Houston. We show you -

SC Apollo 11. We've dumped to 45 per-  
cent. We're stopping now. Do you concur?

CAPCOM Roger, 11. We concur.

CAPCOM - weather for the recovery anytime  
you'd like to hear about it. Over.

SC Go ahead.

CAPCOM 11, Houston. Present forecast

CAPCOM shows acceptable conditions in your recovery area. 2000 foot scattered, high scattered, wind from 070 degrees, 13 knots, visibility 10 miles, and sea stayed about 4 feet. The forecast yesterday showed a tropical storm, Claudia some 500 to 1000 miles east of Hawaii. The - the pictures from earth satellites you were taking yesterday afternoon showed Claudia dissipating, so this appears to be even less a factor than it was before. Your recovery area is now believed to be just a little ways north of the intertropical convergence zone which you can probably see when you look out your windows there. Yesterday there was also a report of a tropical storm, Viola. Further to the west its present location is some thousand miles east of the Phillipines and moving northwest. Tropical storm, Viola, has been intensifying and should be transferred to the typhoon category within the next 12 hours or so, however, that will be far to your west. As a matter of fact, sunrise terminator has not yet reached Viola. When it does several hours from now, you can probably distinguish it from your viewpoint quite readily. As a matter of fact it should be of interest to take some pictures and comment on it when you get a chance to see Viola in a few hours. So that's about the present weather state and situation for your recovery area. Over.

SC Houston, pretty good forecast.

CAPCOM Apollo 11, Houston. Over.

SC Go right ahead, Houston.

CAPCOM 11, Houston. We'd like to try our operation out with the high gain ray here. If you would select reacquire and your S-band antenna to high gain, your positions are pitch plus 40 and yaw 270, and then monitor for acquisition. Over.

SC Okay, it's in work.

CAPCOM 11, Houston. We're just now ready to switch from omni delta over to your high gain antenna. Can you get confirm that you have gone to reac. Over.

SC Confirmed.

CAPCOM That looks real good, Mike. Looks like we picked up about 30 DB on the signal strength.

SC Yeah, I came in quite quickly. However, I'm showing about 24 yaw and about zero on pitch now.

CAPCOM Roger, about 240 and 0.

PAO This is Apollo Control at 172 hours, 38 minutes. Apollo 11 now 108 669 nautical miles from the earth traveling at a speed of 5534 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-23-69, GET 172:40, CDT 13:12 513/1

DEAD AIR

APOLLO 11 MISSION COMMENTARY, 7-23-69, GET 173:01, CDT 13:33 514/1

PAO                      This is Apollo Control at 173 hours, 18 minutes. There are virtually no flight plan activities scheduled at this time. The spacecraft systems all continue to perform normally, and at the present time, Apollo 11 is 106 482 nautical miles from the earth, and velocity is 5607 feet per second. At 174 hours, 24 minutes the spacecraft will be approximately half way between the earth and the moon in terms of distance, and it will be 102 888 nautical miles from the earth and the same distance from the moon. The spacecraft weight at this time is 26 000 pounds.

END OF TAPE

CAPCOM Apollo 11, Houston. Over.

SC Go ahead.

CAPCOM I just wanted to make sure you fellows hadn't gone back to sleep again. And I also have a little bit of late news here if you'd like to find out what's happened in the last 12 - 14 hours. Over.

SC Okay, go ahead.

CAPCOM Oke doak. Hot off the press here, we find Juan Carlos was formally designated yesterday - Tuesday - to become General Franco's successor as the Chief of State of Spain and eventual King. Juan Carlos will be sworn in today as his successor designates after taking an oath of loyalty to the law and the national movement, Spain's only legal political organization. He will apparently be called the Prince of Spain. House Ways and Means Committee also has agreed yesterday to tax changes affecting oil companies, also banks and utilities. House could add as much as 2 billion dollars per year to the federal revenue. The committee also voted tentatively to change the accounting procedures for telephone, electric, and oil pipeline companies and to reduce tax benefits of mutual savings and loans institutions. So, it looks as if tax reform may be on the way. Looking overseas, we find South Korea's first super highway linking toll with the Port of Ingchong has been named the Apollo Highway to commemorate your trip. I think we mentioned last night that President Nixon has already started on his round the world trip and today he is in San Francisco on his first stop which will take him to the U.S.S. Hornet, from which he'll watch the return of your spacecraft. He plans to visit the 7 nations including Rumania during this trip. As I think you also knew, had to miss the All-Star Baseball game yesterday as it was rained out, but it is being played today. The West Coast residents in Seattle, Washington, Portland, Oregon, Vancouver, British Columbia, San Francisco, all plan to make their areas visible to the 3 of you by lighting their lights between 9 p.m. and midnight according to the associated press. We do have clear weather predicted there, so you may be able to see the Christmas lights, porch lights, store lights, and whatever may be turned on. A little closer to home here, back in Memphis, Tennessee, a young lady who is presently tipping the scales at 8 pounds, 2 ounces was named "Module" by her parents, Mr. and Mrs. Eddie Lee McGhee. "It wasn't my idea," said Mrs. McGhee, "it was my husbands." She said she had balked at the name Lunar Module McGhee, because it didn't sound too good, but apparently they compromised on just Module. Over.

CAPCOM Roger, we hear a few chuckles coming from that direction. And we do have a late report on the sports here also. The All-Star game apparently being played.

APOLLO 11 MISSION COMMENTARY 7/23/69, CDT 13:52, GET 173:20, 515/2

CAPCOM                    The present score at the end of the 4th inning has the National League leading the American League by 9 to 3. So the hitters are having a good day, you can tell. And rain clouds are over the MSC area at the moment. It began raining here just about 10 minutes ago, and last report, we were having a pretty heavy deluge. So, that's it from the news front for the afternoon here, Apollo 11. Over.

SC                        Thank you very much, Owen. I think maybe ya'll could use some water.

CAPCOM                    That's very true. I've forgotten exactly how many days it did go Buzz. Something like 30 days without rain, we can appreciate the rain we're getting right now.

SC                        That was Neil. This is Buzz. I wonder if you could find out when was the last time my lawn was cut.

CAPCOM                    That might be a little more difficult to find out. I'm not sure whether the - whether Mike is ready to admit when he last did the job, but I'll look into that for you.

SC                        He'll tell you. He's got a new mower.

CAPCOM                    Roger.

SC                        Hey, how's my cinch bugs? How are they doing?

CAPCOM                    Well, I'm not sure about your's but I can let you know about my own, and their report isn't very good.

PAO                        Owen Garriott is the capsule communicator here in mission control at this time.

END OF TAPE

PAO This is Apollo Control at 173 hours 43 minutes. Apollo 11 now 115 165 nautical miles from Earth, the velocity continuing to increase gradually at 5652 feet per second. The cabin temperature in the spacecraft has been running around 62 degrees and coming up within the next hour Apollo 11 will be crossing the midway point in distance, that to occur at 174 hours 24 minutes and 7 seconds. There will be a briefing at 3:00 p.m. Central Daylight Time in the Building 1 Auditorium on the Lunar Receiving Laboratory.

CAPCOM 11, Houston. Over.

SC Go ahead.

CAPCOM Joan wasn't home right now, Buzz, but Janis reports the grass is getting pretty high and I would estimate it's going to be close to your knees by the time you get out of quarantine. Over.

SC Okay, I'll have to schedule a little dismissal I think if I -

CAPCOM Roger, and no reports from the chinch bugs there, Mike.

SC Well, they're sort of passive turned little fellows. They don't say much, they just jump away.

CAPCOM Concur on that.

SC Which is about what we're doing up here.

CAPCOM We concur on that, too.

SPEAKER I'm not use to all this, but I'm sitting here right beside him.

SC Breakfast was magnificent as usual. I had sliced peaches, sausage patties, 2 cups of coffee, and I forget what all else.

CAPCOM That does sound pretty good. As a matter of fact, I'm way over due for a meal myself here. I could eat some of that.

SC Why don't you get Milt to give you 5 minutes off and grab a hamburger?

CAPCOM I suggested that a while ago. He was pointing out about the weight problem here. We've got to keep the calories low, so I'd better stand by without it.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, CDT 14:23, GET 173:51, 517/1

SC Houston, Apollo 11. We've been doing a little flight planning for Apollo 12 up here.

CAPCOM Roger, go ahead.

SC We're trying to calculate how much spaghetti and meatballs we can get onboard for Al Bean.

CAPCOM I'm not sure the spacecraft will take that much extra weight. Have you made any estimates?

SC It'll be close.

PAO That last comment came from Mike Collins referring Al Bean who is the Lunar Module Pilot for Apollo 12.

CAPCOM 11, Houston. The medics at the next console report that the shrew is one animal that can eat 6 times it's own body weight every 24 hours. This may be a satisfactory baseline for your spaghetti calculations for Al Bean, over.

SC Okay, I guess there's been worse.

SC Houston, Apollo 11. It was rightly colder in here last night than it has been on any previous night. Does EECOM notice any change in data or any explanation for that?

CAPCOM Roger, stand by just a moment. We're going to check some temperatures.

SC Up until last night it was - if anything on the warm side at night. Last night it was on the chilly side.

CAPCOM Roger, then we'll run down the temperature for the two nights.

SC Oh, it's no big thing. Just a matter of interest.

CAPCOM Roger.

SC And how did you like the Command Module RCS temperatures?

CAPCOM 11, Houston. They all look very good. The lowest temperature was 40 degrees, and we're taking a look at your cabin temperatures now.

SC We agree on the CM RCS. No heaters are going to be required by a country mile.

CAPCOM We think that's correct.

SC We don't like those heaters, anyway, working out the (garbled) coils.

CAPCOM Roger.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 14:43 GET 174:11 519/1

CAPCOM 11, Houston, I'll be turning things over to the Green CAPCOM at this time and I'll see you on the ground tomorrow.

SC Okay, Owen. I want to thank you and old purple maroon team there for a good job helping Apollo 11.

CAPCOM Thank you, sir.

SC Thanks again fellows. It was really appreciated.

SC Great job you guys.

CAPCOM Roger, out.

PAO Astronaut Bruce McCandless has just relieved Owen Garriott as Capsule Communicator. At 174 hours 14 minutes Apollo 11 is 103 440 nautical miles from Earth traveling at a speed of 5713 feet per second.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston, Apollo 11.

CAPCOM 11, this is Houston. With reference to your subjective evaluation that it felt cooler inside the spacecraft last night, we reported earlier that we did indeed see a drop of about 3 degrees over the previous night. Looking back, it appears the crew of Apollo 10 reported similar feelings during the translunar and transearth coast phases. We're wondering if you could give us any indication of the relative amount of free or condensed water in the cabin last night and the night before from which we could infer humidity. Over.

SC That might be a little bit difficult to do. We'll take a look at the tunnel now. It does seem that though between the dirt and all, we've had a little bit more moisture in the tunnel - correction - the LM hadn't been opened yet and we were translunar.

CAPCOM Roger. We were more curious about the relative amount of moisture between, say last night and the night before, both of which would have the LM missing.

SC There's more moisture in the tunnel now than there has been at any previous time, but subjectively we have been unable to determine any change in - any build-up in humidity. There appears to be no moisture any other place in the spacecraft for example, the windows are not fogging, and various other cool spots of the spacecraft, all then appear to be completely dry.

CAPCOM This is Houston. Roger. Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 15:03 GET 174:31 520/1

PAO This is Apollo Control at 174 hours, 35 minutes. Apollo 11 now 102 286 nautical miles from earth and we have crossed the halfway point in terms of distance at 174 hours and 24 minutes and 7 seconds. The briefing on the Lunar Receiving Laboratory is scheduled to begin at MSC in Building 1. We'll tape record any conversations with the spacecraft and play those back immediately following the press conference. This is Apollo Control at 174 hours, 36 minutes.

END OF TAPE

PAO This is Apollo Control at 175 hours, 42 minutes. Apollo 11 is now 98 512 nautical miles from the earth. The velocity, 5892 feet per second. During the preceding press conference, we accumulated about 7 minutes of taped conversation which we'll play back for you now.

SC How's all the greens today, Bruce?

CAPCOM Oh, the greens' in good shape. The actual green team has been here for several hours but we're dogging the watch down here to position on for entry. Over.

SC Roger. Understand. Did Dave Reed get to explain the lunar search at the press conference?

CAPCOM No but your comments about Phil Shaffer and the explanations were quoted in the paper last night.

SC Oh, oh.

CAPCOM You want to say anything more while your on the line?

SC He's right. He's absolutely right.

SC How about White Burt, did he ever let you go get a cup of coffee when we were over on the back side?

CAPCOM Oh things have been going pretty smoothly down here. He's really not that hard to get along with.

SC He must be mellowing.

CAPCOM Well we've only got 2 of them back there right now.

SC He always used to make me sit at the console through the back side then, just for training.

CAPCOM Well what we have here is - that was because we're having you come back. You have to retrain.

SC I'm excited.

SC Houston, Apollo 11. Out of curocity on those 70 millimeter cameras we figured we exposed some 300 in the LM and around a thousand in the Command Module and both cameras are in the cabin (garble) if only all cameras worked this fine.

CAPCOM Okay very good. Thank you.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, this is Houston. You won't have to change LIMA for your entry operations checklist dated July 23. Over.

SC Dated when?

CAPCOM July 23.

SC I'm not sure that we've been gone long enough. Oh well.

CAPCOM Okay. If you've got the entry

CAPCOM operations checklist handy then  
I'll pass it up to you. Over.  
SC How can you make changes after  
lift-off?  
CAPCOM You sure you don't mean Jim?  
SC Negative. It just came up today.  
Over.  
SC So you're the first to get to us.  
Go ahead.  
CAPCOM Okay. On page 6-1 of the entry out  
checklist down towards the bottom after main deploy push  
button, we have 3 additional steps we'd like you to  
accomplish. The intent of this is to reduce the oxygen  
pressure in your manifold and to eliminate the oxygen  
GLYCOL through the portable and waste water tanks during  
descent. Over.  
SC Okay. We (garble)  
CAPCOM Okay. Down at the bottom, you've  
got 10 000 feet main parachute deploy, main deploy push  
button push within 1 second. And after that step, we'd  
like you insert stowage tank O2 valve OFF, repress  
package valve OFF and director O2 valve OPEN. You copy.  
SC Okay. At the bottom, after main  
deploy push button push, stowage tank O2 OFF and repress  
vacuum center OFF Director 2 ON. Over.  
CAPCOM Roger. And down at the very bottom  
of 6-2 where you see director 2 OFF verify, delete that  
step completely. Over.  
SC Roger.  
CAPCOM And for record purposes, this will  
be change LIMA. Over.  
SC Okay. We've got it. How far open  
do you want this Director 2, to be open at this point? I  
guess you want it - just leave it open from that point on?  
CAPCOM Roger. It should go all the way  
open and you can just leave it on from that point on. The  
intent is to completely depressurize the oxygen manifold.  
Over.  
SC Roger. Copy.  
CAPCOM Apollo 11, this is Houston. For  
your information the all-star game has just ended with  
the National League winning 9-3 over American. Over.  
SC Roger. Thank you.  
CAPCOM And I have a message here for Mike  
that says "All the chinch bugs are gone". Over.  
SC Having done their job I guess.  
CAPCOM Along with 1 tree it turns out.  
SC Yes. I heard about that and that  
was right before the flight.

APOLLO 11 MISSION COMMENTARY 7-23-69 CDT 16:14 GET 175:42 521/3

CAPCOM Right. That big storm.  
PAO This is Apollo Control. That  
brings us up to date with the tape recorded conversation.  
We'll continue to stand by for any further communications  
with the spacecraft. During the previous conversations  
you heard Mike Collins toss a couple of good-natured bobs  
at Flight Director Cliff Charlesworth. Collins was  
Capsule Communicator on Charlesworth's shift during the  
Apollo 8 mission. At 175 hours, 51 minutes Apollo 11 is  
98 034 nautical miles from the earth.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 16:24 GET 175:52 522/1

ALL DEAD AIR

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 175:22, CDT 16:54 523/1

CAPCOM Apollo 11, this is Houston. Are  
you still up there? Over.  
SC Yes, we are, but not quite so  
far as we were a while ago.  
CAPCOM Roger. We concur. We just wanted  
to make sure that we had good comm with you.  
SC Okay.  
CAPCOM For general information, 11, you  
are now 95,970 miles out from the earth. Over.  
SC Our own back yard.  
CAPCOM Say again.  
SC Right in our own back yard.  
CAPCOM Roger that.  
SC Trying to come down hill a little  
bit now. What's our velocity?  
CAPCOM Your velocity is 5,991 feet per  
second.  
SC Thank you.  
CAPCOM And you are indeed coming down  
hill.

PAO This is Apollo Control at 176 hours  
44 minutes. Apollo 11 now 94,961 nautical miles from earth.  
The velocity has just gone over the 6,000 foot per second  
mark. We're 6,029 feet per second. The next item scheduled  
on the flight plan is a television transmission. That's  
scheduled to occur at ground elapsed time of 177 hours  
30 minutes, which would be 6:02 PM Central Daylight Time.  
Among the clocks counting down or up to and from significant  
events here in Mission Control. We have one counting down  
to entry. That clock now shows 18 hours 18 minutes and  
12 seconds until entry. Reentry is scheduled to begin based  
on no further midcourse corrections at 195 hours 3 minutes  
5 seconds. At this time, it appears that midcourse correction 7,  
if it were done, would only require 0.2 of a foot per second,  
and based on current tracking, we wouldn't expect to have to  
midcourse correction 7, although the tracking will be continued  
and a decision on midcourse correction 7 will not be made  
until closer to the time of the maneuver.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 17:19 GET 176:47 524/1

ALL DEAD AIR

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 177:07, CDT 17:39, 525/1

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead, Houston.

CAPCOM Roger, 11, I've got a flight plan update for you to give an optimum attitude for the earth in the number 1 window and the moon in number 5 window, over.

SC Ready to copy.

CAPCOM Roger, your attitude will be roll 12 degrees, pitch 270 degrees, yaw zero degrees. High gain antenna angles, pitch +14, yaw 263, over.

SC Roger, I copy. Roll 012 Pitch 270, Yaw zero, high gain antenna pitch +14 and Yaw 263.

CAPCOM Roger, I have one coming out of PGC. You might be advised that your dead band has been collapsed, so that's all the check list items, over.

SC Roger, that.

PAO And this is Apollo Control at 177 hours 11 minutes. Our network controller advises that we're starting to get some semblance of TV signal from the spacecraft. We suspect that we may be getting some checkout. We'll continue to stand by and be prepared to take what-ever's happening.

CAPCOM Eleven, this is Houston. We're receiving a light signal from you right now but we are getting TV, over.

PAO This is Apollo Control. The network controller now reports that the TV signal is down. Apparently having been turned off and we suspect that what we have is a test of the system by the crew. The television transmission from the spacecraft is scheduled to begin at 177 hours 30 minutes or about 2 minutes past 6, Central Daylight time. At the present time Apollo 11 is 93 thousand 2 hundred 18 nautical miles from the earth.

END OF TAPE

COMM TECH Goldstone Comm Tech Net 1.  
COMM TECH Goldstone Houston Comm Tech Net 1.  
COMM TECH Goldstone Comm Tech.  
COMM TECH Roger. Check for keys please.  
COMM TECH Roger.  
COMM TECH Goldstone, Houston Comm Tech.  
COMM TECH Goldstone Comm Tech. 100 percent keys.  
COMM TECH Roger. Thank you.  
COMM TECH I'm in mode Net 1 now.  
COMM TECH Roger.  
CAPCOM Apollo 11, this is Houston. Over.  
SC Go ahead.  
CAPCOM Some signal strength indications that a  
steer or two may be locked up on a side lobe with a high gain  
antenna. We'd like you to go into wide band width for about  
15 seconds and then back to narrow. Over.  
SC Alright.  
PAO This is Apollo Control at 177 hours, 30  
minutes. We're standing by at this time to receive television  
pictures from the Apollo 11 spacecraft. A short while ago we  
received the test transmission and apparently everything is  
functioning normally. We were receiving television signal  
from Goldstone relayed on through to Houston. We'll continue  
to stand by for the TV.  
SC You want us to go to S-band signal transfer,  
Houston?  
CAPCOM That's affirmative, 11.  
SC You all set for TV?  
CAPCOM Roger, we're all set whenever you're ready  
to send.  
SC Okay.  
CAPCOM Okay, you're coming through loud and clear  
now, 11, with your patch.

END OF TAPE

CAPCOM Okay, you're coming through loud and clear now, 11, with your patch.

PAO We have black and white signals. We should have the conversion up shortly.

CAPCOM With your patch.

ARMSTRONG Good evening. This is the Commander of Apollo 11. A hundred years ago, Jules Verne wrote a book about a voyage to the moon. His spaceship, Columbia, took off from Florida and landed in the Pacific Ocean, after completing a trip to the moon. It seems appropriate to us to share with you some of the reflections of the crew as the modern day Columbia completes its rendezvous with the planet earth and the same Pacific Ocean tomorrow. First, Mike Collins.

CAPCOM 11, this is Houston. We have an LOS here.

ARMSTRONG We'll be right back with you.

CAPCOM Roger.

CAPCOM In the interim, you may be interested in knowing that Jan and the children and Pat and the youngsters and Andy Aldrin are down here in the viewing room watching this evening.

ARMSTRONG We're glad to hear that.

CAPCOM Okay 11, you're back on with Mike in the middle of the screen there.

COLLINS Roger. This trip of ours to the moon may have looked, to you, simple or easy. I'd like to say that it has not been a game. The Saturn V rocket which put us into orbit is an incredibly complicated piece of machinery. Every piece of which worked flawlessly. This computer up above my head has a 38,000 word vocabulary. Each word of which has been very carefully chosen to be of the utmost value to us, the crew. This switch which I have in my hand now, has over 300 counterparts in the command module alone. There is one single switch designed. In addition to that, there are myriad of circuit breakers, levers, rods, and other associated controls. The SPS engine, our large rocket engine on the AFT end of our service module, must have performed flawlessly or we would have been stranded in lunar orbit. The parachutes up above my head must work perfectly tomorrow, or we will plummet into the ocean. We have always had confidence that all this equipment will work, and work properly, and we continue to have confidence that it will do so for the remainder of the flight. All this is possible only through the blood, sweat, and tears of a number of people. First the American workmen, who put these pieces of machinery together in the factory. Second, the painstaking work done by the various test teams during the assembly and retest after assembly. And finally, the people at the Manned Spacecraft Center, both in management, in mission planning, in flight control, and last, but not least, in crew training. This operation is

COLLINS                    somewhat like the periscope of a submarine. All you see is the three of us, but beneath the surface, are thousands and thousands of others, and to all those, I would like to say thank you very much.

CAPCOM                    11, this is Houston. We're getting a good picture of Buzz now, but no voice modulation. And would you open up the F-stop on the TV camera, try 22, please? That appears to be a lot better now. We're still not receiving Buzz's audio.

ALDRIN                    Good evening. I'd like to discuss with you a few of the more symbolic aspects of the flight of our mission, Apollo 11. But we've been discussing the events that have taken place in the past 2 or 3 days here on board our spacecraft. We've come to the conclusion that this has been far more than 3 men on a voyage to the moon. More still than the efforts of a government and industry team. More even, than the efforts of one nation. We feel that this stands as a symbol of the insatiable curiosity of all mankind to explore the unknown. Neil's statement the other day upon first setting foot on the surface of the moon, "this is a small step for a man, but a great leap for mankind," I believe sums up these feelings very nicely. We accepted the challenge of going to the moon. The acceptance of this challenge was inevitable. The relative ease with which we carried out our mission, I believe, is a tribute to the timeliness of that acceptance. Today, I feel we're fully capable of accepting expanded roles in the exploration of space. In retrospect, we have all been particularly pleased with the call signs that we very laboriously chose for our spacecraft, Columbia and Eagle. We've been particularly pleased with the emblem of our flight. Depicting the US eagle, bringing the universal symbol of peace from the earth, from the planet earth to the moon, that symbol being the olive branch. It was our overall crew choice to deposit a replica of this symbol on the moon. Personally, in reflecting the events of the past several days, a verse from Psalms comes to mind to me. "When I considered the heavens, the work of Thy fingers, the moon and the stars which Thou hast ordained, what is man that Thou art mindful of him."

ARMSTRONG                    The responsibility for this flight lies first, with history.

END OF TAPE

ARMSTRONG            The responsibility for the flight lies first with, history and with the giants of science who have preceded this effort. Next with the American people, who have through their will, indicated their desire. Next to four administrations, and their congresses, for implementing that will, and then to the agency and industry teams that built our spacecraft, the saturn, the Columbia, the Eagle, and the little EMU, the space suit and back pack that was our small spacecraft out on the lunar surface. We would like to give a special thanks to all those Americans who built the spacecraft, who did the construction, design, the tests, and put their, their hearts and all their abilities into those crafts. To those people, tonight we give a special thank you, and to all the other people that are listening and watching tonight, God Bless you. Good night from Apollo 11.

CAPCOM            Eleven, this is Houston, we're getting a zoom view out the window now.

SC            Apollo 11, signing off.

PAO            That brief view of the earth came from 91 thousand 3 hundred 71 nautical miles out in space. After a brief and sincere and moving transmission from the Apollo 11 spacecraft. This is Apollo Control at 177 hours 45 minutes.

SC            Houston, Apollo 11, do you want to crank that PTC again, do you have some reason to hold its attitude or what's your pleasure.

CAPCOM            You can crank up PTC again, Mike, any time you like. And I might add I thought that was a mighty fine TV presentation there's certainly nothing I can add to it from down here.

SC            garbled.

END OF TAPE

CAPCOM Apollo 11, this is Houston, over.

SC Go ahead.

CAPCOM Okay 11. I've gotta few small items here. One's flight plan update, and some entry photography information if you are ready to copy, over.

SC Go ahead.

CAPCOM Roger. At 180 hours 50 minutes GET we would like to delete your oxygen fuel cell purge.

SC Okay.

CAPCOM And on the entry photography, if you are going to use a fresh - magazine of color interior film, we recommend the following exposure settings. F 11 at 1/250th frames per second. Focus on 7 feet for the fireball. F 2.0 1/60th of a second. 6 frames per second. Focus on 50 feet when the chute's opened. If you are using a magazine part of which has already been used for interior shots, we recommend F 16 at 1/500th of a second. 6 frames per second. Focus on 7 feet for the fireball. F 2.8 1/60th of a second. 6 frames per second. Focus on 50 feet when the parachutes open, and we would like to know the magazine number if you are intending to use if you have a chance, over.

SC Okay, I think we got those. We will be using a fresh one and it will be - color interior, over.

CAPCOM Roger. When you get - get it out we would like to have the number of the magazine and the letter of the magazine relayed down.

SC Okay, and we're thinking that we might want to run some of this at 12 frames per second. And I think we can get everything from point size of - point 0 size B down that will only give us about 7.8 minutes and (garbled) double that. I guess maybe just an occasional burst to 12 frames would be what we want and the rest of it six.

CAPCOM This is Houston. That plan sounds fine with us Neil.

SC Okay.

CAPCOM And lastly, we would like to know if your storage configuration for entry is going to conform to the nominal. The retros down here are acted to get accurate CG computed for you and in particular where the EVVAS are being stowed, over.

SC Okay. I think we are going to put the EVVAS and helmets the - in the hatch bag and we'll let you know any nonstandard stowage locations that we complete this evening.

CAPCOM This is Houston, Roger, out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 18:34 GET 177:02 530/1

SC Houston, Apollo 11.  
CAPCOM Go ahead, 11.  
SC Roger. The magazine will be using perhaps  
a large magazine M. Over.  
CAPCOM Roger. Understand. Magazine hand is in  
Mike.  
SC That's right.  
CAPCOM Thank you. Out.  
CAPCOM Apollo 11, this is Houston. You're friendly  
green team going off for the night, and going off for the last  
time. We wish to bid you a good night and God speed.  
SC Thank you. We appreciate all that time  
worked up by the green team and we'll be thanking your crew  
as soon as we get back.  
CAPCOM Roger. We'll see you on the ground.  
SC We really enjoyed working with all of you.  
Thank you very much. Over.  
CAPCOM Roger.  
SC As usual all you green.  
CAPCOM They're all smiles down here, even the  
trench.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-23-69 CDT 18:54 GET 177:22 531/1

PAO This is Apollo Control. Here in  
the Mission's Control room of Mission Control Center the  
white team of flight controllers under Flight Director  
Gene Kranz settling in for the 10 hour shift ahead until  
5:00 A.M. Green team Flight Director Cliff Charlesworth  
is now enroute to the Houston Apollo News Center and  
shortly will be there for his Change of Shift Press  
Conference estimating about 10 minutes for his arrival.  
We'll continue to monitor the Apollo 11 air to ground  
circuit should the communications resume. Standing by  
178 hours, 25 minutes ground elapsed time, this is  
Apollo Control.

PAO This is Apollo Control. Apollo  
11 now 88 442 nautical miles out from earth approaching  
at a velocity of 6299 feet per second. Change of Shift  
Press Conference with green team Flight Director  
Cliff Charlesworth due to begin any moment now in the  
NASA Apollo News Center Auditorium. And at 178 hours,  
34 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 179 hours, 9 minutes ground elapsed time. During the past half hour there have been some exchanges between the spacecraft communicator Bruce McCandless here in Mission Control and the crew of Apollo 11. One item they're trying to sort out and troubleshoot some difficulties with the biomedical sensors attached to the chest of Command Module Pilot Mike Collins. Let's play back the accumulated tape and hopefully by the time it's ended, we will have picked up communications again and we'll rejoin the conversation live. Roll tape please.

SC Houston, Apollo 11.

CAPCOM Apollo 11, this is Houston. Over.

SC Roger, I was in a thruster firing activity. We're about ready to crank up PTC if you are.

CAPCOM Roger, go ahead.

SC Okay, thank you.

COMM TECH Go ahead.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM 11, we'd like you to shift to an OMNI antenna configuration at the present time. We're requesting the S-band antenna OMNI switch to Bravo and S-band antenna OMNI switch to OMNI. The high gain antenna track in MANUAL, pitch minus 50, yaw 270. Over.

SC Roger. I'll do that right now.

CAPCOM Roger, and if Mike has a minute, we'd like to do a little bit of troubleshooting. It seems that he's either flatchested or something because we've lost respiration rate on the biomed telemetry. That is, the ZPN trace down here is flat.

SC He was shaving a little bit ago. He might not be finished. Hold on one.

SC The whole blasted wires are connected is all I know.

CAPCOM Okay, Mike. We had a request that you disconnect the yellow connector from the signal conditioner and verify that it looks okay, reconnect it and then if you would check the two electrodes that is placed one on each side of your lower ribcage. Over.

SC Okay, there's a smile on Charles Worth's face now.

CAPCOM Cliff is not on right now. Gene Kranz just relieved him a few minutes ago.

SC Roger.

SC All those wires and things look all right here.

CAPCOM Roger, Mike. We just see variations on our traces. You've connected and disconnected, but the medics still don't have a signal. Looks like you're sending us a message of some sort.

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 19:41 GET 179:09 532/2

SC Well, I promise to let you know if I stop breathing.

CAPCOM Apollo 11, Apollo 11, this is Houston broadcasting in the blind. Request OMNI BRAVO. Request OMNI BRAVO. Over.

CAPCOM Apollo 11, this is Houston. Communication reestablished.

SC What?

CAPCOM Apollo 11, this is Houston. Will you confirm you're in OMNI BRAVO? Over.

SC Okay, that ought to give it to you.

CAPCOM Roger. Out.

CAPCOM Apollo 11, this is Houston. Mike, we're still getting a flat trace on you for the impedance - memograph. Before you turn in this evening you might try putting some fresh paste in the sensors and if that doesn't work the medics have agreed to forget about it. Over.

SC Mike is out of the loop right now. I'll explain that.

CAPCOM Okay, thank you.

SC Houston, Apollo 11. Say again.

CAPCOM Roger, Mike. The trace on your respiration rate is still flat. If you have time this evening before turning in, we would suggest that you try putting some fresh paste in the two electrodes that go on the side of your lower rib cage, and if that doesn't work just give up on it.

SC Out.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7-23-69 CDT 19:51 GET 179:19 533/1

PAO This is Apollo Control. Columbia now 85 198 nautical miles out from earth, approaching earth at a velocity of 6443 feet per second. Still standing by for resumption of air to ground communications which may be difficult in as much as CAPCOM is leaving the room. We'll continue to monitor air to ground as the crew prepares for they're presleep checklists, sets up the passive thermal control mode and sacks out for about a 10-hour rest period in preparation for tomorrow's entry and subsequent recovery in the mid-Pacific aboard the carrier Hornet now hove-to on the aiming point or near the aiming point. Standing by at 179 hours, 27 minutes ground elapsed time, this is Apollo Control.

END OF TAPE



APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 180:25, CDT 20:52 535/1

PAO This is Apollo Control. 180 hours  
25 minutes ground elapsed time. We have some 4 minutes  
accumulated tape in recent transmission between Columbia and  
the ground. We'll roll these tapes at this time.

SC (sound of train)

CAPCOM Hey 11, this is Houston. You might  
tell Buzz not to exercise quite so strenuously. Over.

SC What's the problem?

CAPCOM Say again.

SC What's the problem?

CAPCOM Okay, that's one on us.

11, Houston. Seriously, that comment was just aimed at your  
musical selection.

SC Okay. (sound of train) Come  
on Neil, not so fast. (sound of train) You have an ergometer  
up here.

CAPCOM What was that? Realtime exercise?

SC Just trying to be your ergometer.

CAPCOM Roger.

CAPCOM Apollo 11, this is Houston. Over.

SC Go ahead, Houston.

CAPCOM We'd like to know what your  
plans are as far as turning in this evening. In our flight  
plan we show you coming up to a rest period at about 182 hours  
and what are you planning to do on that? We're going to be  
watching the weather here, and we expect to have an update on  
the weather, here, in about half hour or 45 minutes to pass  
to you. Over.

SC I wonder if you probably stick  
with the flight plan pretty much. We are going to check the  
flights in the northwest corner of the US and southwest corner  
of Canada. If we can see up that high in the northern  
hemisphere. Other than that, we'll be on the flight plan.

CAPCOM Roger. For your information,  
the laser from McDonald Observatory in West Texas will be up  
from about 181 hours and 30 minutes, on for 1 hour. You should  
be able to spot the earth out of the number 1 window every  
time you pass roll 357 degrees and I add, of course, you're  
in West Texas. Over.

SC Okay, thank you. How about  
the number 5 window.

CAPCOM Stand by a minute.  
Roger. For the number 5 window. That'll be - everytime you  
pass 2230 degrees in roll. Over.

SC Beautiful. Thank you. You  
guys are on your toes down there. You have a new, new star  
chart. You must have a new, new star chart. Huh?

CAPCOM Oh, we got a fresh, fresh FAO,  
here.

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 180:25, CDT 20:52 535/2

CAPCOM Honeysuckle, Houston. Contact  
net 1 voice check.

HSK Honeysuckle, read you loud and  
clear.

CAPCOM Roger. Read you the same.  
SC Houston, Apollo 11. How much  
longer do you want to keep charging battery B?

CAPCOM 11, this is Houston. And  
nominally we're looking for about another hour and a half,  
but what we'd like to do, is charging until shortly before  
you turn in for the night. Over.

SC That'll be fine. Are you going  
to want to charge A again at all?

CAPCOM Negative, 11.

SC Okay.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 180:40, CDT 21:12, 536/1

CAPCOM Eleven, this is Houston. At about  
180:45, we'll be handing over from Goldstone to Honeysuckle,  
and I'm handing over to Charlie. See you when you get back,  
over.

SC Okay, Bruce, good night, thank you.  
Thank you very much, Bruce, it's been a pleasure working with  
you.

CAPCOM Have a nice trip down.

PAO This is Apollo Control. The wierd  
noise has been reported by network controllers as not being  
on the down link from the spacecraft. Now it's stopped. Lets  
leave the circuit open here in the period prior to the time  
the crew goes to sleep and moniter the air ground circuit.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 21:32 GET 181:00 537/1

PAO This is Apollo Control. We've been standing  
by now for quite some time for resumption of communications  
but apparently no one is saying anything tonight. Apollo 11  
now 78 134 nautical miles out from Earth, approaching at  
6785 feet per second. And at 181 hours, 17 minutes ground  
elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. We've had one brief communication from Apollo 11. Spacecraft Communicator Bruce McCandless is out of the room, the Assistant Flight Director Chuck Lewis went down to the console to talk. Let's play that tape back and rejoin live when the conversation picks up again.

SC Houston, Apollo 11. Over.

CAPCOM Apollo 11, go ahead.

SC Roger, Houston. For retro I have the anticipated location of all the entries stowage and I suggest you pull out the entry checklist and we'll go through those maps in the front of it.

CAPCOM Apollo 11, Houston. Could you stand by just a few minutes. Charlie and flight are out getting a weather briefing. They're be back shortly.

SC Again?

CAPCOM Say again?

SC Is this Owen?

CAPCOM No, this is Chuck Lewis. Charlie Duke is out with flight getting a weather briefing right now.

SC Okay. Out drinking coffe, I know.

CAPCOM (Laughter) They'll be back momentarily.

PAO I stand corrected. That's Charlie Duke on the CAPCOM slot. Bruce McCandless on the last half hour has been relieved. Charlie is likely to respond. Now he's putting on his headset. We'll listen in.

CAPCOM Hello Apollo 11, Houston. Over.

SC Roger, Houston, Apollo 11. Did you get the word on the entry checklist?

CAPCOM Roger, Mike. We sure did. We're ready to talk about it, if you are. Over.

SC I think the quickest thing is go through page by page, the first part of the entry checklist where it has a map. Starting on the page with compartment L2 and L3. Are you with me?

CAPCOM Roger. With you.

SC Okay. L2 is as shown. L3 is as shown, there is about half the food remaining in L3.

CAPCOM Roger.

SC . Where it says "and note" the CMP PGA's is located in the L-shaped bag with the other 2 PGAs. The LM shield was jettisoned with the - correction, the CMP's helmet shield was jettisoned with the LM and his helmet and gloves instead of being in the sleep restraint are in the hatch bags.

APOLLO 11 MISSION COMMENTARY 7-23-69 CDT 21:59 GET 181:00 538/2

CAPCOM                    Okay. Let's see now. Your PGA is in the L-shape bag with the other two PGAs and your helmet and gloves are in the L-shape bag instead of the sleep restraint.

SC                         A - the helmet and gloves are in the hatch bag, the great big bag that's underneath the left hand couch that you put the hatch in.

CAPCOM                    Roger. I thought I - that's what I copied. Okay. Go ahead.

SC                         Okay, the next page is identical except nit picking point are one - -

END OF TAPE

SC Okay, the next page is identical nit-picking point out R 1 we got the entry check list, other than that it is identical and the third page is got some changes.

CAPCOM Go ahead.

SC In A 1, are you with me? I'm over there in compartment A 1.

CAPCOM Go ahead, Mike, over.

SC In compartment A 1 16 millimeter magazine will be located in window number 04 instead of 05. Tissue dispensers, there is only one of them left, and compartment U 3 the 16 millimeter bracket is on window 04 and the PGA bag add the CMP PGA plus add 2 LPG, and compartment A 8, delete 2 LPG, add 1 TPK making a total of 4, and add 10 pounds of LM miscellaneous equipment. We told you 5 the other day. We think 10 is probably closer, over.

CAPCOM Copy.

SC That's all the changes on that page. Ready for the next page?

CAPCOM Rog, go ahead, Mike.

SC On your next page in compartment B 1, we estimate about 15 percent of that food is remaining. In B 2 we took EPK and put trash in it. In B 3 the 16 millimeter cable, the 18 millimeter lens and the right angle mirror are on window number 04 and that's - there brings you all up-to-date.

CAPCOM Roger, how about the - the levers, Mike, where did you put those, over?

SC They're in the hatch bag.

CAPCOM Roger. Standby, - our only concern, 11 is with the stuff you got in the hatch bag. That's pretty big bulk between you and AA and we'd like to talk about moving that over to the sleep restraint if you will standby I'll verify that, over.

SC Okay.

CAPCOM 11, Houston. Our recommendation on the gear you got on the helmet bag, correction hatch bag, would be to remove that stuff and put it in the sleep restraint on the right couch. The reason is that the hatch bags traps are only - configured for zero "G" and it is a pretty difficult job getting it latched down. With the gear in the sleep restraint, it's a pretty standard latch down procedure and you could also use the Betta cord that you have onboard. You concurr, over.

SC Yeah, we'll look at it Charlie, and let you know.

CAPCOM Roger, and I got a couple of other things, Mike. We need to terminate battery B charge at this time and also the weather is clobbering in at our targeted landing point due to scattered thunderstorms. We don't want to tangle with one of those so we are going to move the - your aim point uprange, correction, it will be downrange, to target for 1500 nautical mile entry so we can guarantee uplift control. The new coordinates are

APOLLO 11 MISSION COMMENTARY, 7-23-69, CDT 22:09, GET 181:37:00, 539/2

CAPCOM 13 degrees, 19 minutes North, 169 10 minutes West. The weather in that area is super. We got 2,000 scattered, 8,000 scattered with 10 miles visibility and 6 foot seas and the Hornet is sitting in great position to get to that targeted position, over.

SC Roger.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69, GET 181:47, CDT 22:19, 540/1

PAO This is Apollo Control. To recap briefly, the conversation a few moments ago between Charlie Duke and the crew of Columbia. Because of forecast thunderstorms in the prime recovery area in the midpacific for tomorrow the Apollo Spacecrafts lifting capabilities will be used to stretch the entry path some 215 nautical miles farther down range toward Hawaii to a new landing point, aiming point with the very rough preliminary coordinates of 13 degrees 19 minutes north by 169 degrees 10 minutes west. These numbers will be refined through the night as retrofire officer exercises the computer and comes up with more definitive numbers. These will be passed on as they are available. Apollo 11 now 75 thousand 9 hundred 51 nautical miles out from earth approaching at 6 thousand 8 hundred 99 feet per second. At 181 hours 50 minutes and standing by on the air ground circuit this is Apollo Control.

CAPCOM Apollo 11, Houston, some of the general last minute updates here. On the entry, we had told you on the camera to set it at 50 feet, it turns out the biggest number on the camera is 25 feet so just set it at infinity, over.

SC Roger, infinity.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 22:29 GET 181:57 541/1

CAPCOM Hello, Apollo 11, Houston. We're ready to put you to bed and say good night if you give us your crew status report and verify that you chased out the CO2 canister a moment ago. Over.

SC Stand by.

SC Okay, Charlie. Crew status report follows.  
CDR 11023, CMP 10025, LMP 09027. Canister change complete.

CAPCOM Roger. Thank you very much there.

SC All men okay.

CAPCOM Roger. Thank you. Could you give us the onboard readout, please, sir?

SC Stand by. Okay, Bat C 37, Pyro Bat A 37, Bat B 37, RCS A 51, D 63, C 62, D 58.

CAPCOM Roger. Copy. Thank you much.

CAPCOM Apollo 11, Houston. It's good night from the white team for the last time. We'll be off when you wake up in the morning. It's been a pleasure working with you guys. It was a beautiful show from all three of you. We appreciate it very much and we'll see you when you get out of the LRL. Over.

SC Okay, Charlie, thanks to you and all the white team for a great job done there all the way through. Thank you.

SC Outstanding.

SC Thank you guys very much, Charlie. Thanks.

CAPCOM Thanks to you guys, too.

CAPCOM 11, Houston. Mike, you get your chance at landing tomorrow. No go around.

SC Roger. You're going to let me land closer to Hawaii, too, aren't you?

CAPCOM That's right, sir.

PAO This is Apollo Control. All good nights having been said, the crew of Apollo 11 is now preparing to get their 10 hours rest and their last night in space. Here in the Control Center one of the 10 by 10 Eidophor television projectors - a drawing has been projected on the screen ribbing Capcom Charlie Duke for his slight error yesterday on the television pass where he mistook the moon for Earth. It has the spacecraft midway between the moon and Earth and it says, "Neil, I just spotted a continent on the moon. Charlie, the camera's on Earth now." Apollo 11 now 74 906 nautical miles out from Earth approaching at 6954 feet per second. And at 182 hours, 6 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/23/69, GET 182:10, CDT 22:42 542/1

PAO This is Apollo Control. 182 hours  
10 minutes ground elapsed time. We thought that was all the  
air-to-ground for tonight prior to the crew going to sleep,  
but just a few moments ago, there was a brief exchange reporting  
to Apollo 11 crew that the McDonald Observatory or West Texas  
had the spacecraft in their telescope field of view. Let's  
roll that tape now and then shut it down again.

CAPCOM 11, Houston. We got some word just  
a moment ago, that the McDonald Observatory is - said they  
had picked up the spacecraft in their telescope. Over.

SC Outstanding. We have been looking  
for their laser for - but haven't had much luck yet.

CAPCOM Roger. We'll pass it on to them, Neil.  
Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 23:58 GET 183:25 543/1

PAO This is Apollo Control, 183 hours,  
25 minutes ground elapsed time. Columbia spacecraft, now  
69,520 nautical miles out from earth. Approaching at 7,262  
feet per second. Crew now in their rest period. Started  
their sleep period a little over an hour ago. To reiterate  
the change in landing point, this is a weather avoidance  
situation where thunder storms are forecast for the landing  
point - the original landing point in the Pacific, therefore,  
after the normal entry interface the lifting characteristics  
of the Apollo Command Module will be used to extend entry  
range some 250 nautical miles farther down range toward  
Hawaii to a preliminary aiming point, that is the aiming  
point may shift around between now and entry which is some  
11 hours, 36 minutes from now. But at any rate the aiming  
point as calculated now is some 13 degrees 19 minutes north  
latitude, by 169 degrees 10 minutes west longitude. The  
preliminary time of drogue decline is 195 hours, 12 minutes.  
As you were - yes 195 hours, 12 minutes, 4 seconds. And  
the net extension of - over the earlier splash time is  
something like 40 seconds. At 183 hours, 27 minutes ground  
elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 23:58 GET 183:25 543/1

PAO This is Apollo Control, 183 hours, 25 minutes ground elapsed time. Columbia spacecraft, now 69,520 nautical miles out from earth. Approaching at 7,262 feet per second. Crew now in their rest period. Started their sleep period a little over an hour ago. To reiterate the change in landing point, this is a weather avoidance situation where thunder storms are forecast for the landing point - the original landing point in the Pacific, therefore, after the normal entry interface the lifting characteristics of the Apollo Command Module will be used to extend entry range some 250 nautical miles farther down range toward Hawaii to a preliminary aiming point, that is the aiming point may shift around between now and entry which is some 11 hours, 36 minutes from now. But at any rate the aiming point as calculated now is some 13 degrees 19 minutes north latitude, by 169 degrees 10 minutes west longitude. The preliminary time of drogue decline is 195 hours, 12 minutes. As you were - yes 195 hours, 12 minutes, 4 seconds. And the net extension of - over the earlier splash time is something like 40 seconds. At 183 hours, 27 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/23/69 CDT 02:01 GET 185:29 544/1

PAO This is Apollo Control at 185 hours 29 minutes Ground Elapsed Time. 9 hours 33 minutes until entry. Crew is still asleep at this time, scheduled to wake up at 189 hours Ground Elapsed Time, some 3 and one half hours from now. We've had no word from the crew since the scheduled sleep period began. Apollo 11 now 61 034 nautical miles out from the Earth, and velocity of 7815 feet per second. At 185 hours 30 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 3:00 GET 186:28 545/1

PAO This is Apollo Control 186 hours 28 minutes Ground Elapsed Time. 8 hours 35 minutes to entry. Crew of Columbia still asleep at this time. Some 2 and a half hours away from wakeup time at 189 hours Ground Elapsed Time. Because of weather avoidance in the prime recovery zone in the mid-Pacific, southwest of Hawaii, it has been decided some time ago to shift the landing point - aiming point - some 215 nautical miles downrange from the pre-mission aiming point. And all the numbers concerned with entry and post-entry events have been generated, and we shall forward them at this time. Pencils ready? Command Module-Service Module separation, 194:48:07 Ground Elapsed Time, 11:20:08 Central Daylight Time; entry enterphase, that's 400 000 feet above the Earth's surface, Ground Elapsed Time 195:03:07, 11:35:08 Central Daylight Time; begin blackout, 195:03:25 Ground Elapsed Time, 11:35:26 Central Daylight Time; 05G, 195:03:35 GET, 11:35:36 CDT; end of blackout, 195:06:56 GET, 11:38:57 CDT; drogue parachutes deploy, 195:12:04 GET, 11:44:05 CDT; main parachutes deploy, 195:12:52, 11:44:53 CDT; touchdown, 195:17:49 GET, 11:49:50 CDT. Maximum G-loading to be pulled during the entry phase will be 6.12G's. Entry velocity, that's at entry enterphase of 400 000 feet, will be 36 194 feet per second. Flight path angle, minus 6.5 degrees. Aiming point location, 13 degrees 19 minutes north latitude, 169 degrees 09 minutes west longitude. At 186 hours 32 minutes Ground Elapsed Time, this is Apollo Control.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, GET 187:28 CDT 4:00, 546/1

PAO This is Apollo control 187 hours, 28 minutes ground elapsed time. 7 hours, 34 minutes to entry. Flight surgeon Ken Beers reports that all three crew members are sleeping soundly at this time. Their sleep period will end probably at 189 hours although they may sleep an additional hour to 190 hours. Spacecraft being tracked now through the Guam station. A line projected out from earth to what is called a subsatellite point or a point directly under the spacecraft would put it over dead center of Australia. At 187 hours, 29 minutes ground elapsed time, this is Apollo control.

END OF TAPE



APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 6:00 GET 189:20 549/1

PAO This is Apollo Control at 189 hours 28 minutes. Apollo 11 is 40,961 nautical miles from the earth. Approaching at a velocity of 9,671 feet per second. Mid course correction number 7 has been cancelled and as a result we will let the crew sleep until an elapsed time of 190 hours. Weather in the recovery area. Well we're getting a call from Apollo 11, now. Let's listen to that.

SC Roger. What's the status on mid course 7?

CAPCOM Roger. We were going to let you sleep in until about 190 hours. Mid course 7 is not required.

SC Okay. Thank you.

PAO The crew gave us a call at 189 hours, 29 minutes. We advised them of the cancellation of the mid course correction. Weather in the recovery area - skys will be partly cloudy. Cloud base is at 2,000 feet scattered. Wind, east north east at 18 knots. 6 foot sea. Temperature 80 degrees. This landing area is 215 miles to the northeast from the original landing area, moved because of thunder showers in the original area. This new location should allow the recovery ship USS Hornet to arrive in Hawaii 4 to 5 hours earlier than originally planned. We expect that it may be possible for the carrier to arrive at Pearl Harbor somewhere between 8 and 9 o'clock, on July 26, that's Saturday.

PAO The crew is probably preparing breakfast now and it's not likely that we'll hear a lot from them right away, but we'll continue to stay up alive for any conversation.

PAO Visibility in the recovery area is 10 miles.

PAO Clock shows we are 5 1/2 hours away from entry interface the point at which Apollo 11 will enter the earth's atmosphere. That's scheduled to occur at an elapsed time of 195 hours, 3 minutes, 7 seconds. We expect landing at 195 hours, 17 minutes, 49 seconds.

PAO This is Apollo Control. Apollo 11 is now 38,793 nautical miles from the earth. Velocity 9,947 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, GET 189:52 CDT 6:25 550/1

PAO - - headed up by flight director Milt Wendler is beginning to come aboard, handover and progress from Gene Kranz, white team. Crew still asleep at this time. Some 6 hours, 34 minutes from entry enterphase. And, at 188 hours, 29 minutes ground elapsed time, this is Apollo control.

PAO This is Apollo control at 190 hours, 10 minutes. Apollo 11's distance from earth, 36 956 nautical miles. Velocity, 10 195 feet per second.

END OF TAPE

CAPCOM  
Houston. Over.

Apollo 11. Good morning from

SC Good morning, (garbled).

CAPCOM Roger. We saw you up stirring around, and we thought that you were probably eating your breakfast there. Just in general we'll probably start coming up with the uplink and the state vector and the target loads and what have you at about 190:50 somewhere there in and get you started to work.

SC Okay.

CAPCOM And in the meantime while you're eating your breakfast there, I've got the Maroon Bugle all standing by here to give you the morning news.

SC Glad to hear it.

CAPCOM Okay, Apollo 11 remains the prime story with the world awaiting your landing today at about 11:49 a.m. Houston time. In Washington, House tax reformers have fashioned a provision which would make it impossible for wealthy individuals to avoid income tax entirely through tax free investments or special allowances. Under the proposal tentatively adopted by the House Ways and Means Committee, everyone would pay taxes on at least half of their income.

SC Hang on a minute.

CAPCOM Roger, standing by.

SC Okay, roger. Okay, Ron, we're ready to go again. Thank you.

CAPCOM Roger, continuing with the Maroon Bugle. President Nixon surprised your wives with a phone call from San Francisco just before he boarded a plane to fly out to meet you. All of them were very touched by your television broadcast. Jan and Pat watched from mission control here. The Launch of Intelsat from the Cape was postponed for the fourth time last night. The problem was said to be a malfunctioning nitrogen regulator in the second stage of the Delta. A new attempt will be made to launch it tonight. The research submarine Ben Franklin, which is studying the gulf stream, set a record by drifting 24 hours from 10 to 100 feet above the ocean floor in 1300 feet of water off the Georgia coast. The mission is lead by Jacques Piccard. Wally Schirra has been elected to a five year term on the Board of Trustees of the Detroit Institute of Technology. He will serve on the Institute's development committee. Air Canada says it has accepted 2,300 reservations for flights to the moon in the past five days. It might be noted that more than 100 have been made by men for their mothers-in-law. And finally it appears that rather than killing romantic songs about the moon, you have inspired hundreds of song writers. Nashville, Tennessee which probably houses the largest collection of recording companies and song publishers in the country now

APOLLO 11 MISSION COMMENTARY, 7-24-69, GET 190:12, CDT 6:45 551/2

CAPCOM reports it is being flooded by moon songs. Some will make it. The song at the top of the best sellers list this week is, "In the year 2525." Morning Bugle. Out.

SC Thank you very much, Ron.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69. CDT 6:59, GET 190:27, 552/1

SC Crew status report. 5.575.5.

CAPCOM Apollo 11, Houston. Roger, we copy, and I have your consumables update if you're ready to copy.

SC Go ahead.

CAPCOM Roger. GET 189 plus 00. RCS minus 1 percent. ALPHA minus 11, BRAVO plus 10, CHARLIE minus 1, DELTA minus 1. H2 total minus .76 pounds, oxygen total plus 17.6 pounds. Over.

SC Okay. It doesn't look like we're going to be able to get quite back on the flight plan.

CAPCOM Not quite, just about though.

PAO This is Apollo Control at 190 hours, 34 minutes. Apollo 11's distance from the Earth 34 622 nautical miles, velocity 10 534 feet per second.

CAPCOM Apollo 11, Houston. Request POO and ACCEPT, and we'll send your REFSMMAT, state vector, and entry target load. Over.

SC You have it.

CAPCOM Roger, it'll be coming up.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 7:19, GET 190:47 553/1

CAPCOM Apollo 11, Houston. Can you tell us where the visor assemblies ended up there?  
SC We're going to follow your suggestion and stow them under right-hand couch.  
CAPCOM Roger, mighty fine. Break the weather forecast in the landing area, right now is 2000 scattered, high scattered 10 miles. The wind about 080 at 18 knots. You'll have about 3 to 6 foot waves. Your Delta H is plus 10 feet. And it looks like you'll be landing about 10 minutes before sunrise, over.  
SC Okay, sounds good.  
CAPCOM Roger.  
CAPCOM Apollo 11, Houston. All 3 loads are in. The computer is yours, over.  
SC Roger.  
CAPCOM And Mike, if you're on loop there to extend the range in the compass G reentry, here, I've got a little procedure, is you would like to look at them.  
SC Stand by, one. I'm right in the middle of my orange juice, just be with you in about 5 minutes.  
CAPCOM Sure, no problem, standing by.  
SC Houston, Apollo 11. Heh, Ron, I wonder if you could give us a good Navy explanation for this Delta H time, over.  
CAPCOM Roger, let me think about it, and I'll come back.  
SC You too, uh.  
CAPCOM Right.  
SC Collins has got one, but I'm not sure I buy it.  
PAO This is Apollo Control at 190 hours 56 minutes. Apollo 11's distance from earth 32 447 nautical miles; velocity 10 876 feet per second.  
CAPCOM Apollo 11, Houston.  
SC Go ahead.  
CAPCOM Roger, 11. We don't have worry about it any more. The altimeter out there, is now standard 29.92, but basically what it means is that if I give you a plus 10 feet for instance, that means that you will hit the water with the altimeter reading 10 feet, over.  
SC All right. Now, Collins was wrong.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 7:39 GET 191:07 554/1

PAO This is Apollo Control at 191 hours, 15 minutes. Apollo 11 is now 30 469 nautical miles from earth approaching at a velocity of 11 221 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 7:59 GET 191:27 555/1

PAO This is Apollo Control at 191 hours 38 minutes. Apollo 11's distance from Earth now 27 979 nautical miles, velocity 11 689 feet per second.

CAPCOM Apollo 11, Houston. I have your entry pad. Over.

SC Stand by one.

CAPCOM Roger, standing by.

SC Okay, I'm ready to copy.

CAPCOM Roger. Entry pad area is the mid-Pacific, roll 000 152 001. GET 194:46:06 267. Latitude plus 1332 minus 16917 064 36 194 649. Range to go 14045 36275 195 03 06 0028 VL max 154 084 22400 18000 B0 400 0213 0017 0351 0902 Sextant star 450189 277. Foresight star none available. Lift vector UP. Comments, GDC align Vega and Deneb roll 078, pitch 223, yaw 340. Additional comments: Use non-exit EMS pattern EI minus 30, horizon check GET 194:33:06. Pitch 298, you'll get P65 but no P66. Additional notes: Initial bank angle in P67 may not be full lift. Apollo 11, Houston. Read back.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 8:20 GET 191:48 556/1

SC Okay, Ron, for Mid Pac: 000152001 1944606  
267 plus 1332 minus 16917 06436194 649 14045 36275 1950306  
003 154 084 2240 180 400 0213 0017 0351 0902 45 0189 277

None available Lift vector UP, GET align Vega and Deneb  
roll 078, pitch 223, yaw 340. Use non-exit EMS. EI minus  
30 horizon check 1943306 pitch 298. Initial bank angle

in P67 may not be full lift, and we will get P65 but no P66.

CAPCOM Apollo 11, Houston. Roger on your GDC  
align pitch, it should be 233, 233 in the pitch. Over.

SC Okay. I've got a 233.

CAPCOM Also your VL and MAX and MIN I'm sure  
are 22 400, and 18 000. Over.

SC Yes, that's right.

CAPCOM Okay, if you'll dig out your entry  
checklist there on page E6-1, I'll update your retro times  
there for the various altitudes. Over.

SC Okay, go ahead.

CAPCOM Okay, on page E6-1, your RRT is 0720,  
your 50K is 0816, 40K is 0830, 24K is 0902, and your 10K is  
0951. Over.

SC Okay, RRT 0720 50 000 0816. That's -  
0720 is the time of (garbled) from RRT, and 40 000 0830,  
24 000 0902, 10 000 0951.

CAPCOM 11, Houston. You started out right then  
the numbers you read back were correct. I didn't get your  
comment in between there.

SC I said that all I wanted to know is that  
first time 0720, that's the time of (garbled), right?

CAPCOM That's affirmative.

SC Okay.

SC Houston, Apollo 11. I'm ready to copy  
your message about the constant drag level.

CAPCOM Okay, Mike. Of course, this is in the  
event the G&N and the EMS quits and you have to fly the  
constant G, and what we're trying to do is extend the constant  
G range from 1100 to 1500 miles. We've run this procedure  
in the simulators and it works fine. The best way to go  
through it, just go through it and if you have any questions  
come back. But it's the same lift vector UP until MAX G,  
and then lift vector DOWN and then modulate the lift vector  
until g dot goes to zero. Okay, this procedure is essentially  
the same so far, and then hold g dot zero until you pass the  
retro elapsed time of V circular and then after you pass this  
retro elapsed time of V circular, roll to a gimbal angle  
of 45 degrees, and then hold this constant bank angle of 45 degrees  
until you've come to the retro elapsed time of drogues. Over.

SC Okay, it sounds straight forward enough.  
Understand constant G backup procedure lift vector UP until  
MAX g and then lift vector DOWN, then modulate until bank  
angle until g dot equals zero, then g dot equals zero until

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 8:20 GET 191:48 556/2

SC sub circular and then roll 45 degrees and hold until drogue time. Over.

CAPCOM Hey, that's mighty fine, Mike. That's correct.

PAO This is Apollo Control at 192 hours 2 minutes. This will be first time in Apollo that crews have flown lift vector UP during reentry. Normally, lift vector is down. However, we want to extend the range by 215 miles so for a short period about a minute and 25 seconds during the blackout period the spacecraft will be flown with lift vector up. The computer program for that is number 65, up control. Apollo 11 is now 25 301 nautical miles from Earth, velocity has increased to 12 263 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 8:35, GET 192:03, 557/1

PAO This is Apollo Control at 192 hours 30 minutes. Apollo 11 now 22 130 nautical miles from earth; velocity 13 053 feet per second. We're 2 hours 32 minutes 32 seconds away from entry interface.

END OF TAPE

PAO This is Apollo Control at 192 hours, 48 minutes. Apollo 11 is 19 914 nautical miles from the Earth approaching at a velocity of 13 695 feet per second. We're 2 hours, 14 minutes, 16 seconds away from entry into the atmosphere, the U.S. Air Force C-135 crew will attempt to photograph this re-entry of the command module. Aircraft designated A-lots for airborne light-weight optical tracker system will attempt to record the entry on 70-millimeter still film. Pilot of that aircraft is the ARIA Squadron Commander. Three of his ARIA Aircraft will be in the entry area to provide communications during re-entry of the command module. Crew of ALOTS includes the Commander, Colonel Robert W. Hoffman of Wichita Falls, Texas. The pilot who is the ARIA Squadron Commander Colonel Oakley W. Baron of Kankakee, Illinois, Co-Pilot Lt. Col. Wallace L. Emory, San Angelo, Texas. Navigators are Lt. Col. Ervin O. Stewart, Jr., Greensboro, North Carolina, and Major Charles W. Hinton, Mt. Auburn, Illinois. The photographic Specialist Master Sergeant Paul T. Swieczkowski whose home town is not listed. Col. Baron's nickname is the Red Baron who is a veteran of more than 10 000 flying hours, and has flown more than 80 different types of aircraft.

PAO Normally the mission control center here in Houston will not attempt to contact Apollo 11 after drogue chute deployment. We will stay off the air and let the recovery forces attempt to establish voice contact. If for some reason, Capcom does want to communicate with the crew, he will request clearance from the recovery forces before putting in a call.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-24-69, GET 192:53, CDT 9:25 559/1

PAO                                    This is Apollo Control at 192 hours, 55 minutes. A few of the entry event times have changed from a second to 4 seconds. Others remain the same. Here's the updated times: entry, 195 hours, 3 minutes, 7 seconds; begin blackout, 195:03:25, 05g 195:03:36; end blackout, 195:07:00; drogue shoot deployment, 195:12:08; main shoot deployment, 195:12:56; landing 195:17:53. Maximum G load expected during the entry, 6.20.

SC                                    This entry time line is my kind of time line. Nice and slow.

CAPCOM                                11, Houston. Roger, it sure is. EECOM is anxiously awaiting his big moment here for the launching sequence check whenever you're ready.

SC                                    Okay, we'll be ready for this in just a flash.

CAPCOM                                Roger.

CAPCOM                                Apollo 11, Houston.

SC                                    Go ahead, Ron.

CAPCOM                                This is Jim, Mike. Our crew is still standing by. I just want to remind you that the most difficult part of your mission is going to be after your recovery.

SC                                    Well, we're looking forward to all parts of it.

CAPCOM                                Please don't sneeze.

SC                                    Keep the mice healthy.

END OF TAPE

SC The earth is really getting bigger  
up here and, of course, we see a crescent.

CAPCOM Yes.

SC We've been taking pictures and we  
have four exposures to go and we'll take those and then  
pack to camera.

PAO And the Apollo 11 backup crew  
there has joined CAPCOM Ron Evans at his console, Jim  
Lovell, Bill Anders and Fred Hayes. Also Donald K. Slayton,  
Director of Flight Crew Operations, is at that console.

SC Houston, Apollo 11, we're ready  
for the logic check whenever you are. We're standing by  
to arm the logic. We've got ELS logic on, ELS auto and  
all the circuit breakers in.

CAPCOM Apollo 11, Houston. Roger you can  
press on with the SECS logic.

SC Okay, logic 1 coming on. MARK it.  
Logic 2 coming on, MARK it.

CAPCOM Apollo 11, Houston, logic checks  
good. You're GO for PYRO arm.

SC Thank you, Sir.

SC Houston, Apollo 11, has VHF  
simplex on -

CAPCOM Apollo 11, Houston. Roger. You  
faded out a little there, Buzz. I understand you have the  
VHF simplex A on now. Is that correct? Over.

SC That's affirmative, VHF simplex A and  
we're PR on VHF.

CAPCOM Roger. Mighty fine. We'll watch  
it as you are coming on in and let you know when the  
intelligibility is up and we'll make a voice check with  
you at that time.

SC Houston, Apollo 11. I've been  
holding here in SCS control minimum deadband rate low with  
the limit cycle on just as a matter of curiosity, if you  
guys wanted some fuel numbers from us.

CAPCOM 11, Houston. Roger. We copy and  
we've been figuring it out.

SC Okay.

SC It's a pleasure to be able to waste  
gas.

CAPCOM Roger. That's affirm.

PAO This is Apollo Control at 193 hours,  
10 minutes. Apollo 11 is now 17 158 nautical miles from  
earth. Velocity 14 633 feet per second.

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 9:35 GET 193:03 560/2

CAPCOM Apollo 11, Houston, with a little recovery force information. Over.

SC Go ahead.

CAPCOM Roger. The Hornet is on station just far enough off the target point to keep from getting hit. Recovery 1, the chopper is there. They are on station and Hawaii rescue 1 and 2 the C130's are within 40 minutes of your target point. Over.

SC Sounds good. Thank you.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 9:50 GET 193:18 561/1

PAO This is Apollo Control at 193 hours 20 minutes. Apollo 11 is 15 854 nautical miles from Earth, velocity 15 154 feet per second. We're just - we're 1 hour 43 minutes away from entry and here are the altitudes at which the entry events are expected to occur. Entry at 75 statute miles, beginning blackout at 62 statute miles, 05 g 57 statute miles, end blackout 41 statute miles, drogue chute deployment 23 300 feet, and main chute deployment 10 500 feet.

CAPCOM Apollo 11, Houston.

SC Roger. Just to get a little down link here to check out our VHF. I show us about an hour and 37 minutes approximately from entry interface. Over.

SC Okay, that's about right.

CAPCOM Okay, looks like we're together on that, and I guess we're standing by for you to whip into the entry attitude.

SC Okay. We've just been taking a couple of last minute pictures. We've finished the EMS entry check, primary water evap activation.

CAPCOM Roger, mighty fine.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 10:00, GET 193:28, 562/1

PAO This is Apollo Control at 193 hours  
30 minutes. Apollo 11 now 14 374 nautical miles from earth;  
velocity 15 788. We expect entry velocity at 36 194 feet  
per second.

CAPCOM Apollo 11, Houston.

SC Go ahead.

CAPCOM Roger. Mike, we recommend the left  
VHF antenna for VHF.

SC Thank you, Ron.

CAPCOM And this is your friendly backup CMP,  
have a good trip, and may (garbled) come in BEF.

SC You better believe, thank you kindly.

PAO Capcom that time was Fred Hayes, the  
backup lunar module pilot.

SC Looks what I considered to be a correct  
size.

SC Houston, Apollo 11. Like to switch to  
S-band OMNI C. I just did a minute ago, and noticed a loss  
of signal strength, over.

CAPCOM Roger, Apollo 11. Go ahead and try it  
again now that you're in attitude.

SC Roger, going OMNI C.

CAPCOM Apollo 11, Houston.

CAPCOM Apollo 11, Houston. Recommend antenna  
Bravo, over.

PAO At 193 hours 40 minutes, Apollo 11's  
distance from earth is 13 044 nautical miles; velocity  
16 439 feet per second.

CAPCOM Apollo 11, Houston. Recommend antenna  
Bravo, or at least a better one, over.

CAPCOM Apollo 11, Houston.

SC Go ahead, Ron.

CAPCOM Roger. Our faces are red here. We lost  
data with you - there for a while. Did you do the P52, over.

SC That's affirmative, we completed the  
P52. We'll give you the data from it in just a second. We  
passed our sextant star check at entry attitude and right now  
we're maneuvering to our first horizon check pitch attitude of  
298 degrees.

CAPCOM Roger, copy that, 11.

END OF TAPE

APOLLO 11 MISSION COMMENTARY 7/24/69, CDT 10:20, GET 193:48, 563/1

PAO Apollo Control at 193 hours, 50 minutes.  
Apollo 11's distance now 11 463 nautical miles approaching  
at a velocity of 17 322 feet per second. We're just under  
an hour away from scheduled command module-service module  
separation and about an hour and 12 minutes away from entry.

CAPCOM Apollo 11, Houston. About 4 minutes  
to 1 hour, and we'll give you the mark on 1 hour. Was a  
command module pre-heat necessary? Over.

SC Negative that.

CAPCOM Roger, copy. Negative command module  
pre-heat.

PAO This is Apollo Control at 194 hours.  
Apollo 11's distance from Earth now 10 066 nautical miles.  
Velocity 18 227 feet per second.

CAPCOM Apollo 11, Houston.

SC Go ahead.

CAPCOM Roger. We don't want to jettison the  
hydrogen tank that stratifies, so could you cycle the fans  
in tank 2, please? Hydrogen tank 2.

SC . You better believe. That old service  
module has taken good care of us. You better take good care  
of it.

CAPCOM It sure has hasn't it.

SC It's been a champ.

PAO That was Mike Collins.

PAO Apollo 11 is 1 hour away now from entry  
into the Earth's atmosphere.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-24-69, GET 194:03, CDT 10:35 564/1

CAPCOM 11, Houston. I'll give you a  
time hack at 58 minutes to go. It's about 15 seconds yet.  
SC Thank you.  
CAPCOM Stand by. MARK, 58 minutes.  
SC Roger.  
PAO This is Apollo Control at 194 hours,  
10 minutes. Apollo 11 is now 8 5 -  
SC Go ahead, Houston. Apollo 11.  
CAPCOM Roger. We have our update at  
the state vector for you. Request POO and accept. Over.  
SC Okay, you've got it.  
CAPCOM Okay, here it comes.  
PAO Spacecraft distance is 8 393 nautical  
miles. Velocity 19 512 feet per second. Rescue and ARIA  
aircraft are reported on station, and the Hornet's helicopters  
containing the swimmers are recorded airborne. Swim 1 is  
helicopter number 53. Three swimmers from that helo are  
expected to place the collar on the spacecraft, floatation collar.  
Crew of swim 1 consists of Leutenant Commander Donald G. Pitchmand,  
pilot.  
CAPCOM Apollo 11, Houston.  
SC Go ahead.  
CAPCOM Roger. The computer's yours  
now. Looks like you're in VHF range here. So we'll try a  
VHF check for you. We'll just send VHF up to you. Stand by.  
SC Okay.  
CAPCOM Apollo 11, Houston. VHF check  
on simplex ALFA. Over.  
SC Roger, Houston. Apollo 11 VHF  
simplex ALFA loud and clear. How me? Over  
CAPCOM Roger, 11. Houston. You're  
loud. The standard VHF noise though makes you realize that  
S-band is good.  
SC Roger, understand. Thank you.  
CAPCOM Apollo 11, Houston. Back'up  
S-band now, and we're standing by for command module RCS  
activation.  
SC Okay, we're just about there.

END OF TAPE

PAO Swim One's pilot Commander Richmond is from Orlando, Florida. Copilot Lt. William W. Strawn of Plymouth, Michigan, Crewman James R. Johnson, Raleigh, North Carolina. The swimmers aboard Swim One are Lt JG John McLachlan of Spokane, Washington, PH2 Terry A. Muehlenbach, Chatsworth, California, and ADJ3 Mitchell L. Bucklew, Sanford, Florida. These 3 swimmers are scheduled to attach the floatation collar and then move away from the command module while helicopter number 66, designated Recovery One, moves into the area and deploys 1 swimmer, Lt. Clancey Hatelberg.

CAPCOM Apollo 11, Houston, you are GO for pyro arm.

SC Thank you, Houston.

PAO Lt. Clancey Hatelberg, Chippewa Falls, Wisconsin, will deploy from Recovery One wearing a biological isolation garment and he will hand to the crew through the hatch their biological isolation garments. At 194 hours 16 minutes Apollo 11 is 7512 nautical miles from Earth, velocity 20 304 feet per second.

CAPCOM Apollo 11, Houston, your command module pressurization looks mighty good to us.

SC Looks good here, too.

CAPCOM And 11, Houston, I've got an update for about 4 items on your entry pad.

SC Ready to copy.

CAPCOM Roger, your MAX G 063. Your NOUN 60 your GAMMA at 400K, 648, your range to go on the EMS 14033 and your retro time for V circular 0214. Over.

SC Roger, copy MAX G 6.3, R2 at NOUN 60 6.48, range to go EMS 14033, our ETV circular 0214. Over.

CAPCOM Roger, readback is correct there.

PAO The crew of helicopter 66, Recovery One the pilot Cdr. D. S. Jones of Madison, Wiscon; Copilot LtJG Bruce A. Johnson, Bremerton, Washington, and the 2 crewmen who will assist the astronauts into the Helo AWHC Norvel L. Wood of Carmi, Illinois and AWHC Stanley G. Robnett of Portales, New Mexico.

PAO At 194 hours 22 minutes distance is 6509 nautical miles velocity 21 366 feet per second.

SC Houston, Apollo 11.

CAPCOM Apollo 11, Houston, go.

SC Roger, the first horizon check 1942306 at a pitch angle of 298 does not quite fall on the 31 7 line. It's just a little high, it's within sight of the greton.

CAPCOM Apollo 11, Houston, the horizon check there was supposed to be at 33. Over.

SC That's fine, thank you.

CAPCOM Roger.

PAO Helo number 64 is designated Swim Two.



APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 11:00, GET 194:28, 566/1

PAO Apollo 11's distance now 5411 nautical miles; velocity 22 642 feet per second.

CAPCOM Apollo 11, Houston. Command module RCS looks fine to us.

SC Same here, Ron, looks very good. Doesn't make as much noise as we thought. Some of them are barely audible.

CAPCOM Roger. And 11, Houston. Weather still holding real fine in the recovery area. Looks like it's about 1500 scattered, high scattered. And it's still 3 to 6 foot waves.

SC The air part of it sounds good.

CAPCOM Roger. 11, Houston, I'll give you another mark at 33 minutes. Stand by. Mark.

SC Roger, thanks.

SC Houston, Apollo 11. Do you have any recommended settings to catch the sunset, over.

CAPCOM Roger. We'll - the time is 36 41. And stand by for some settings.

SC Okay, I'll probably only be doing it maybe - part of it at 6 frames a second, some it at 1. So I can be changing settings as it goes through.

CAPCOM Roger, copy.

SC And the horizon check passes, it's right on the money.

CAPCOM Mighty fine, sounds good.

CAPCOM Apollo 11, Houston. On the shooting of the sun, that's 16 at 1 over 250.

SC Understand that's 16 at 1 over 250.

CAPCOM Roger.

SC And the sun's going down on schedule. It's getting real dark here.

CAPCOM Fine Apollo 11, Houston, copy.

PAO Distance 3896 nautical miles; velocity 24 915 feet per second.

PAO And we're about 10 minutes away from the scheduled separation time now.

PAO Apollo 11's distance now is 3000 nautical miles; velocity 26 685 feet per second. In the next 20 minutes Apollo 11 will add almost 10 000 feet per second to that figure.

END OF TAPE

PAO Technical difficulties have interrupted the radio-TV news pool feed from the carrier USS HORNET and also the newswriters copy feed from that ship.

PAO Guidance Officer reports the command module computer looks good and the guidance and navigation system is GO aboard the spacecraft.

CAPCOM Apollo 11, Houston. We see you getting ready for sep. Everything looks mighty fine down here.

SC Thank you, Ron. Thank you.

PAO We are awaiting confirmation of separation. We confirm separation now from on the ground readings from telemetry. We confirm separation.

CAPCOM Apollo 11, Houston. You still look mighty fine from here. You're cleared for landing.

SC We appreciate that, Ron.

SC Roger. Gears down the lock.

CAPCOM Roger.

PAO Altitude 1288 nautical miles, velocity 31 232 feet per second.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-24-69, GET 194:53, CDT 11:25 568/1

PAO Flight Director, Milt Windler,  
has just informed recovery "We're on the final for the carrier."

SC Houston, we've got your service  
module on 5. A little high and a little bit to the right.

CAPCOM Roger, thank you.

SC And it's rotating just like it  
should be. Thrusters firing.

CAPCOM Good, it's got alot of gas there  
to burn out too.

SC Coming across now from right to  
left.

CAPCOM Houston, roger.

PAO 800 nautical miles high. Velocity  
33 000 feet per second. Guidance reports Apollo 11 right down  
the middle of the corridor. 7 minutes away from entry.

SC Houston, Apollo 11. You going  
to turn on the tape recorder shortly?

CAPCOM 11, Houston. You can go ahead  
and turn it on.

SC Okay, I'll have to go to command  
reset to do that.

CAPCOM 11, Houston. That's negative.

All you have to do is turn it on. That'll be fine.

SC I guess I don't know how to  
turn it on then. I got PCM on lock, record forward, high bit  
rate at barberpole.

CAPCOM 11, Houston. We'll send the  
on command from down here and see if it works.

SC Okay.

PAO Velocity 34 630 feet per second.

SC There's the moon whipping by the  
field of view right now.

CAPCOM Roger, copy.

PAO Velocity coming up on 35 000 feet  
per second now. 3 minutes to entry. Apollo 11 in the proper  
attitude and -

CAPCOM 11, Houston. We'll have you  
for about 3 or 4 minutes through Redstone, then we'll pick  
you up after black out through ARIA.

SC Roger.

PAO Apollo 11 lined up right down  
the middle of the entry corridor. Velocity's now 35 578 feet  
per second. We're a minute and 45 seconds from entry. Black  
out will begin 18 seconds after entry.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 11:23, GET 195:01, 569/1

SC Houston, Apollo 11, I'm going to go to command reset and turn the tape on, out.

CAPCOM 11, Houston. Recommend negative on that. That will put us in low bit-rate.

SC Okay, I already put it to command reset, but they still have barber-pole on the tape. And my light switch is high bit-rate.

CAPCOM Okay, that will be fine. On 225 there if you can reach it, Buzz, the last two set of records on the second row from the bottom, you can punch those in.

PAO 36 000 feet per second.

CAPCOM And 11, Houston, don't mess around with that 225 there.

SC Okay.

CAPCOM And 11, Houston, you're going over hill there shortly, you're looking mighty fine to us.

SC See you later.

PAO We're at entry time. Blackout very shortly. Range to go to splash 1533 nautical miles. There's blackout. This blackout period should last for about 3 minutes 45 seconds. At blackout we were showing velocity 36 237 feet per second. Range to go to splash 1510 nautical miles. The elapse time for end of blackout 195 hours 7 minutes even. Drogue shoot deployment time is 195 hours 12 minutes 8 seconds. And the Control Center will not attempt to communicate with Apollo 11 after drogue deploy time. It will leave the air ways clear for the recovery forces..

PAO ARIA 3 reported a visual contact.

PAO We're at 3 minutes 20 seconds since entry, and the blackout should end about 3 minutes 53 seconds after entry. We're about 11 minutes away from landing. ARIA 3 would - is the up range ARIA aircraft.

CAPCOM Apollo 11, Houston through ARIA.

CAPCOM Apollo 11, Houston through ARIA.

CAPCOM Apollo 11, Houston through ARIA 4.

PAO The Hornet reports Air-Boss 1 has visual contact.

CAPCOM Apollo 11, Houston through ARIA, standing by, over.

CAPCOM Apollo 11, Houston, in the blind Air-Boss has a visual contact.

PAO The Hornet now reports a visual contact. Visual contact from the recovery ship.

PAO Hornet reports momentary visual contact has now disappeared behind clouds.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7-24-69, GET 195:10, CDT 11:42 570/1

PAO We're 7 minutes, 44 seconds from entry. Drogue shoot deployment scheduled for an elapsed time for an entry of 9 minutes, 1 second.

CAPCOM Apollo 11, Houston. Standing by for your DSKY reading. Over.

PAO Hawaii rescue 2 reports an S-band contact with the spacecraft.

CAPCOM Apollo 11, Houston. Stand by for your miss distance. Over. Apollo 11, Houston. Standing by for your DSKY reading. Over.

SC Drogues.

CAPCOM Apollo 11, Houston. Your DSKY reading please. Over.

SC (Garble)

PAO Apollo 11 reports right on. We take that to mean that the drogues deployed on time.

SC 69, 15.

PAO Apollo 11 should be on main chutes now. Hornet reports a sonic boom a short time ago. We're just under 4 minutes to landing. We will continue to monitor for any conversations between the spacecraft and recovery forces, but we will not initiate a call from now on for the spacecraft from the control center.

HORNET Apollo 11, Apollo 11. This is Hornet, Hornet. Over.

SC Hello, Hornet, this is Apollo 11 reading you load and clear. Our position 133:0, -69:15.

HORNET Roger, Hornet copy. 13301675.

Any further data?

SC 330, 169, 15.

PAO Hornet has voice contact. Aircraft reports visual with 3 full chutes.

HORNET A condition of crew. Over.

SC The condition of crew is 4000 - 3500 feet on the way down.

HORNET 11, this is Hornet. Copy. 11, what's your splashdown error? Over.

SC Okay. Our splashdown error is by latitude, longitude, 133016915. That's (garbled).

HORNET Roger, out.

PAO Hornet reports spacecraft right on target point.

HELO Okay, Hornet. Apollo 11 in sight.

HORNET Roger. Apollo sighted on chutes.

HELO (Garbled) contact here at 150 holding.

Apollo 11, (garbled).

HELO 190.  
HORNET Hornet, roger, out.  
HELO (garbled) bearing 2 zero zero.  
SC Apollo 11 at 1500 feet.  
HORNET Hornet, roger, copy, out.  
PAO That's Neil Armstrong giving the  
position report.  
HELO Have a visual of about a  
mile and a half.  
HELOS (garbled)  
HORNET Hornet, roger.  
HELOS (garbled) spacecraft.  
SWIM 1 Roger, this is swim 1, Apollo 11.  
SC (garbled) 100 feet.  
SWIM 1 Roger, you're looking real good.  
HELOS (garbled)  
SWIM 1 Splashdown, Apollo has splashdown.  
HORNET Hornet, copy. (Garble)  
HELOS (garbled)  
SC (garbled) splashdown.  
SWIM 1 This is Swim 1. The command module  
is stable 2, stable 2. Over.  
HORNET Hornet, roger.  
AIRBOSS Okay, Hornet. This is Airboss.  
We're orbiting your data at 1000 feet. Roger, out.  
HORNET Roger.  
PAO Stable 2 is upside down. The  
flotation bags will right the spacecraft.  
SWIM 1 Roger. The module is in stable  
2. The dye marker is deployed, and the chutes appear to be  
detached and are down wind from the command module.  
HORNET Hornet, roger.  
AIRBOSS Roger, thank you. 235135. 235  
(garbled)  
SWIM 1 This is Swim 1. The command  
module is still in stable 2. The dye marker is beginning to  
trail now just a (garbled) in the west. The main chutes are  
detached and (garbled) down wind.  
HORNET Hornet, copy.  
PAO It normally takes 8 to 10 minutes  
for the rotation bags to right the spacecraft. Swim 1 is  
getting ready to deploy swimmers.  
AIRBOSS This is Airboss, Recovery 1 and photo 1,  
go to high frequency.  
RECOVERY Roger, Recovery to high frequency.

END OF TAPE

RECOVERY Roger, Recovery 1.  
RECOVERY 4 to 1, 4 to 1, (garbled) Over.  
SWIM 1 This is Swim 1 (garbled)  
RECOVERY Hornet, copy.  
RECOVERY Photo, are you going to pick up (garbled)  
PHOTO 1 This is Photo 1, roger.  
ARIA 3 (garbled) Air Boss 1, this is Hornet  
bridge. Request commentary if available, over.  
AIR BOSS Visible trailing (garbled) west at  
060 15 knots. (garbled)  
30 degrees to the vertical toward the downwind side.  
AIR BOSS Recovery 1, the drogue chutes shall be  
clear of all aircraft.  
RECOVERY It's a few miles to the north.  
AIR BOSS This is Air Boss. We currently have  
3 helos on the screen the drogue chutes splashed down  
approximately 1500 yards on a bearing of 240 from the command  
module.  
AIR BOSS Hornet, this is Air Boss. I see you  
copying the commentary.  
RECOVERY This is Hornet, copy affirmative.  
PHOTO 1 This is Photo One. The 3 (garbled) is  
(garbled) plus 20 feet and two floatation bags are visible  
at this time (garbled) to go to 4. (garbled) module (garbled)  
above the other (garbled) of the vertical axis (garbled).  
AIR BOSS Hornet, I didn't copy Photo 1's full  
report. Understand 2 floatation bags deployed and in stable  
1 now. Is that correct? Over.  
PHOTO 1 (garbled) it is upright, but  
it isn't (garbled) stable 2.  
AIR BOSS Understand still stable 2.  
PHOTO 1 (garbled)  
PAO Apollo 11 reported still in stable 2,  
but gradually righting itself.  
RECOVERY Air Boss comment. I am not copying  
Photo 1's relay. Over.  
AIR BOSS This is Air Boss 1. Photo 1 says that  
it is still in stable 2. The bags are inflated. It is not  
absolutely inverted now, it's 70 degrees to the vertical  
axis. Still in stable 2.  
PHOTO 1 This is Photo 1. The module is now  
90 degrees to the vertical axis.  
PHOTO 1 This is Photo 1. The command module is  
stable 1 floatation bags are inflated.  
PAO Apollo 11 is stable 1 now, stable 1.  
PHOTO 1 (garbled)  
HORNET Air Boss 1, this is Hornet Bridge. Say  
when it is stable 1. Over.  
AIR BOSS (garbled) stability above the vertical  
axis is approximately 30 degrees.  
HORNET Roger.  
HORNET Air Boss, Hornet. Recovery 1 is ready to  
deploy swimmers in 1 minutes, Swim Two, Swim Two. (garbled)

HORNET (garbled)  
HORNET Hornet, roger.  
RECOVERY (garbled) is on low mode.  
PAO Swimmers to deploy in about 1 minute.  
SWIM 2 (garbled) is in position. (garbled) we  
are going to lower the first swimmer.  
AIR BOSS Roger, Swim Two start recovery at once.  
You are cleared.  
RECOVERY Okay, commencing.  
SWIM TWO Swim Two is commencing to put the first  
swimmer in the water.  
PHOTO 1 The hatch of the capsule is now to the  
up wind to the first swimmer. This is Photo 1. There are no  
dye markers in the water. The first swimmer (garbled)  
HORNET This is the Hornet. Did -  
PHOTO 1 Swim Two dropped his first swimmer.  
AIR BOSS Yes, affirmative. This is Air Boss.  
The swimmer is in the water.  
PHOTO 1 The swimmer is in the water and he is  
connecting (garbled) deployed.  
AIR BOSS Hornet, the sea anchor has been detached  
and is deployed.  
HORNET Has deployed, roger, copy swim one  
now.  
SWIM 2 The sea anchor is deployed (garbled)  
AIR BOSS Roger, copy.  
PAO The sea anchor has been deployed by the  
swimmer.  
SC (garbled) Apollo 11.  
PHOTO 1 This is Photo 1. The swimmer has given  
us thumbs up. (garbled) 2 is standing (garbled) for 2 swimmers  
and the floatation collar.  
AIR BOSS Apollo 11, Air Boss condition of  
the crew?  
SC Air Boss Apollo 11, everyone inside, our  
checklist is complete, awaiting swimmers.  
SWIM 2 (garbled) 2 swimmers and the floatation  
collar secured to the command module.  
AIR BOSS Air Boss, Harnet. What's the condition?  
SWIM 2 The crew is excellent. Both checklists  
have been completed. They are ready to take on the swimmers.  
SWIM 2 (garbled) the water.  
PAO 3 swimmers in the water from Swim Two,  
Swim Two Helo.  
SWIM 2 (garbled)  
AIR BOSS Apollo 11, this is Air Boss. Are you  
copying a narration or following the sequences of recovery  
operations?  
SWIM 2 This is Photo L. (Garbled)  
SC (garbled) just before that last call.  
We've just been picking up your COMM now.  
SWIM 2 (garbled) Floatation collar half way  
around the command module.

APOLLO 11 MISSION COMMENTARY 7/24/69 CDT 11:52 GET 195:20 571/3

PAO                           The crew has reported to Air Boss that they are in excellent condition. Flootation collar is about half way around the spacecraft now.

SWIM 2                       The command module (garbled) quite well vertical axis of (garbled) down wind 10 degrees. (garbled) flootation collar. The 4 to 1, the uprighting bags 2 are fully inflated, 1 is partially inflated.

END OF TAPE

APOLLO 11, MISSION COMMENTARY, 7/24/69, CDT 12:02, GET 195:30, 572/1

HORNET - of the flotation collar. Photo 1, the uprighting bags - 2 are fully inflated, 1 is partially inflated.

SWIM 1 Air Boss. Are you copying?  
AIR BOSS Affirmative, roger.  
PHOTO 1 The flotation collar has been attached.

PAO The flotation collar is attached now.  
PAO And the collar is inflated.  
PHOTO 1 Photo 1, the swimmers are - the lift has approached.

PAO Air boss reporting the spacecraft riding very smoothly.

HORNET Swan, this is Hornet. Bridge, request the tacan on top. Over.

PHOTO 1 This is Photo 1. The raft is in the water - 241 radial - nine miles. The raft is inflated.

PHOTO 1 (garble) command module.  
PHOTO 1 Photo 1, I repeat very - from Hornet, 241 radial, 9 miles. Over.

HORNET Roger.  
PHOTO 1 Photo 1, (garbled)  
(GARBLED)

AIR BOSS 1 Apollo 11 this is Air Boss 1. We have the command module on radar bearing of 244. (garble) - 12 miles.  
PHOTO 1 Second raft is in the water. Raft number 2 is inflated. And number 2 is being (garble).  
PHOTO 1 Recovery 1 has moved into position. Standing by to deploy the swimmer.

HORNET Roger  
PAO Recovery 1 getting ready to deploy the swimmer with the biological isolation garments. The other swimmers -

PHOTO 1 Photo 1, the water in the area - (garble) 1 swimmer is in raft number 1 (garble) In raft number 2 the (garble) deploy the sea anchor.

PHOTO 1 Recovery is approaching - to drop the -  
PHOTO 1 Swimmer is in the water. Swimmer is in raft number 2. Recovery 1 is in position standing by to lower the (garbled).

PAO The swimmer with the biological isolation garments is in the raft next to the spacecraft. That's Lt. Clancy Hadleburgh of Chippawaw Falls, Wisconsin. He's also wearing a biological isolation garment.

PHOTO 1 Recovery 1 is in this position lowering the bag of BIGS at this time.

HORNET Roger.  
PAO And the HELO is lowering the astronauts BIGS, or biological isolation garments to Lt. Hadleburgh.  
PHOTO 1 The bag of BIGS is -  
PAO And the report is that the bag of BIGS is in raft number 2.  
PHOTO 1 The swimmers are unloading the net at this time.

APOLLO 11 MISSION COMMENTARY 7/24/69, CDT 12:02, GET 195:30, 572/2

PHOTO 1 This is Photo 1. The bag of BIGS and  
pecontaminant are in raft number 2 - module is very stable,  
very stable. There's only, about the verticle axis, a (garbled)  
HORNET Roger.  
HORNET Air Boss, Hornet. What is the present  
condition of the Astronauts?  
AIR BOSS - determing the condition of the  
astronauts. Hello Apollo 11, Air Boss 1 - what is you condition?  
SC Our condition is all 3 excellent. We're  
just fine. Take your time.  
HORNET All right.  
PAO That was Mike Collins reporting the  
crew was excellent.  
PHOTO 1 One swimmer is trying to don - one swimmer  
is in raft No. 1.  
HORNET All right, we copy. Big swimmer preparing  
to don suit. One swimmer in raft with full suit - (garble).  
PHOTO 1 This is Photo 1 (garble).  
PAO Lt. Hatleberg putting on his biological  
isolation garment.  
PHOTO 1 The visibility is in vicinity of 17 miles.  
AIR BOSS Photo 1, this is Air Boss. (Garble)  
SC Photo 1. The winds are from 065 or 060 -  
20 knots - 4 to 6 feet. Over.  
HORNET Roger.  
SWIMMER This is Photo 1. The big swimmer is  
making adjustments to his garment. He has his helmet on -  
raised to his shoulders. He's trying to zip it up at this time.

END OF TAPE

PAO The ship reports it is now 7 miles  
from the spacecraft.  
SWIMMER 1 This is swimmer 1 saying big swimmer  
is - (garble) at this time.  
RECOVERY (Garble) position of the sea  
buide. Over.  
SWIMMER 1 This is Swimmer 1, reported earlier  
there was no dye marker (garble)  
RECOVERY (Garble)  
SWIMMER 1 (Garble)  
RECOVERY (Garble)  
SWIMMER 1 (Garble) command module.  
RECOVERY (garble) identify (garble).  
SC This is Apollo 11. Tell everybody take  
your sweet time. We're doing just fine in here. It's not  
as stable as the Hornet, but all right.  
PHOTO 1 This is Photo 1. Apollo 11 reports  
everything is fine. Not as stable as the Hornet but  
almost. Over.  
RECOVERY Hornet, roger.  
PHOTO 1 This is Photo 1, Raft No. 2 is  
within 10 feet of the command module at this time.  
PHOTO 1 Roger. Photo 1 my big trouble is try-  
ing to transport to raft No. 2 to (garble) transfer the -  
PAO Unofficial splash time is 195  
hours, 18 minutes, 21 seconds.  
SWIMMER 1 (Garbled) No. 1 at this time. We  
recovered the command module (garble)  
PAO Hornet reports the other swimmers  
are now upwind of the command module leaving Lt. Hatleberg  
in his BIG and with the decontaminate that will be placed  
around the hatch and on the -  
SWIMMER 1 The big swimmer is securing (garble).  
SWIMMER 1 The big swimmer is (cut out).  
PAO Lt. Hatleberg is now transferring  
the BIGS to the crew.  
SWIMMER 1 (Garble)  
PAO The Hornet now estimates they  
are 4 and three-quarters miles away from the spacecraft.  
SWIMMER 1 (Garble)  
PAO The BIGS are in the command  
module and the hatch has been closed again.  
RECOVERY (Garble) over.  
SWIMMER 1 (Garble)  
PAO Lt. Hatleberg is called the  
big swimmer.

SWIMMER 1 This is Swimmer 1. The big swimmer is (garble) normal procedures on the command module.

PAO The big swimmer is now spraying the hatch area and the top deck and around the hatch on the command module with the decontaminate.

HORNET Apollo 11, this is Hornet. We're 4 miles out, making our approach.

PAO The Hornet advises the crew they are 4 miles away.

SWIMMER 1 This is Swimmer 1. The big swimmer has attached the flotation collar and is now in raft No. 1.

SWIMMER This is Swimmer No. 1. The big swimmer is still in Raft No. 1.

HORNET Swimmer 1, Hornet. Understand big swimmer has completed his decontamination of the command module, is that correct?

SWIMMER 1 (Garble) on the flotation collar.

HORNET Roger.

PHOTO 1 Photo 1, Hornet I passed from Pacific Chief, you are cutting out. You may be releasing your teeth too early on transmissions. Over.

SWIMMER 1 This is Swimmer 1. Roger. Out.

PAO The Hornet reports it was 13 miles along the aim point at splash. The carrier was 13 miles from the aim point at splash.

SWIMMER 1 This is Swimmer 1. Earlier (garble) made preparations to commence -

RECOVERY Roger.

SWIMMER 1 This is Swimmer 1, the big swimmer (garble)

PAO The big swimmer has reported communicating with the astronauts by visual hand signals through the hatch window.

END OF TAPE

SC Photo 1, on the (garbled).  
SWIMMER Photo 1. The astronauts have opened  
the hatch. The first astronaut - got out of the hatch. The  
first - astronaut, right.  
SWIMMER Photo 1, the -  
PAO The first astronaut is now emerging.  
SWIMMER (garbled).  
SWIMMER (garbled) Okay, up wind.  
SWIMMER This is (garbled). There is a Photo 1  
the position very shortly. Position - report on the first  
astronaut is up.  
HORNET Roger.  
SWIMMER Photo 1.  
PAO Astronaut number 2 coming up the hatch  
now.  
SWIMMER The second one. That is (garbled).  
The third astronaut is out of the hatch.  
PAO And the third crewmen is out of the  
spacecraft now.  
SWIMMER (garbled)  
PAO Hatch is closed and secured.  
SWIMMER Every crewmen out. All the astronauts.  
(Garble)  
HORNET Roger.  
PAO Hornet now reports that the swimmer is  
having some difficulty in securing the hatch and one of the  
astronauts is helping him.  
SWIMMER (garbled) locked (garbled) are in.  
(garbled) Report of hatch secure. All three astronauts are  
out. (garbled)  
PAO Hatch is now supported secure.  
SWIMMER Photo 1 (garbled)  
PAO Hornet now 1 and one-quarter miles from  
the spacecraft.  
SWIMMER (garbled)  
SWIMMER (garbled) Photo 1 - - (garbled) on the  
upper portion of the command module.  
HORNET Roger.  
SWIMMER (garbled)  
PAO And the Lt. Hatleberg sprayed decon-  
tamine around the hatch.  
SWIMMER (garbled) the decontaminate putting  
out the lower portion of the command module.  
HORNET Hornet, roger.  
SWIMMER I am now scrubbing (garble)  
HORNET Roger.  
PAO And the swimmer now scrubbing down the  
command module with the decontaminate.  
SWIMMER Photo 1 (garbled). I have completed  
scrubbing the command module. (garbled) The first and the  
second astronaut.

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PAO                               The swimmer has now started scrubbing  
the astronauts' biological isolations garments with the  
decontaminate.

SWIMMER                           (garbled) is complete. And now I'm  
scrubbing the shoulders of the first astronaut.

PAO                               Hornet estimates distance three-quarters  
of a mile now.

SWIMMER                           Hornet, swimmer is scrubbing the  
arm and shoulders of the first astronaut.

HORNET                           Hornet, roger.

END OF TAPE

SWIM 1 The first astronaut is now having his  
 BIG put on him.  
 HORNET Hornet, roger.  
 SWIM 1 The swimmer has completed decontaminating  
 the first astronaut.  
 HORNET Hornet, over.  
 SWIM 1 Coming to the BIG for the second  
 astronaut.  
 PAO And the first astronaut has been  
 scrubbed down and the swimmer has started the decontaminated  
 processes on the BIG of the second astronaut.  
 SWIM 1 (garbled)  
 HORNET Roger.  
 SWIM 1 The swimmer has scrubbed the  
 front side of the second astronaut. He is now in the BIG.  
 HORNET Roger.  
 SWIM 1 Swim 1. The swimmer has completed  
 the (garbled).  
 HORNET Roger.  
 PAO Scrub down on the second astro-  
 naut completed.  
 HORNET Hornet, roger.  
 SWIM 1 This is Swim 1. The swimmer is  
 observing the (garbled) astronauts.  
 HORNET Hornet, roger.  
 SWIM 1 The swimmer is (garbled) over  
 the head of the astronaut.  
 HORNET Hard to see, isn't it?  
 HORNET Swim 1. You were cut out. Say  
 again.  
 SWIM 1 (garbled) says stand by for a  
 call from the recovery station.  
 HORNET Roger.  
 SWIM 1 This is swim 1. The third astro-  
 naut has been scrubbed. (garbled).  
 HORNET Hornet, roger.  
 PAO And the third astronaut has been  
 scrubbed down, and now the astronauts are scrubbing down the  
 swimmer.  
 SWIM 1 The swimmer 1 is ready and standing  
 by for completion of the decontamination maneuver.  
 HORNET Hornet, roger.  
 SWIM 1 This is Swim 1. The (garbled).  
 Both in (garbled)  
 HORNET Roger.  
 SWIM 1 Swim 1 has the astronaut 1 and  
 2 are still in the (garbled).  
 HORNET Hornet, roger.  
 SWIM 1 Swim 1 the -  
 HORNET Hornet, roger.

SWIM 1 Swimmer 1 contamination of the BIG swimmer is complete. The BIG swimmer is now decontaminating swimmer number 1.

HORNET Roger.

SWIM 1 The BIG swimmer has given the signal to the swimming team to prepare to close the CM module.

HORNET All right.

PAO The other swimmers will now proceed to the command module. It has been decontaminated, and the swimmers will remain on their scuba air.

PHOTO 1 Photo 1, Hornet. We request you reconfirm that they are decontaminating raft number 1.

HORNET All right. Photo 1, that is affirmative. Decontaminating raft number 1. The others (garbled).

PHOTO 1 Photo, roger, out.

HORNET Photo 1, raft number 2 is now closing the command module. All 3 swimmers are on board on scuba.

PHOTO 1 Photo, roger.

RECOVERY 1 Recovery 1 are in (garbled) position. Standing by.

HORNET Rog.

SWIM 1 The raft number 2 are at the command module. The swimmers are taking their positions.

HORNET Roger.

RECOVERY 1 Recovery 1 is commencing his approach.

HORNET Hornet, copy.

SWIM 1 Raft 1 is riding very smooth.

HORNET Hornet, roger.

END OF TAPE

SWIM 2 (garbled) The astronauts are in a cheerful mood. They are waving at the photographers. (garbled)

AIR BOSS Photo 1, Hornet understand recovery is making approach to pick up the first astronaut?

PHOTO 1 This is Photo 1. He's in position ready to commence recovery. Over.

AIR BOSS Roger.

PHOTO 1 Hornet, this is Photo 1. Recovery 1 is commencing his first approach.

AIR BOSS Roger.

PAO And Recovery 1 going in now to pick up the first astronaut.

PHOTO 1 This is Photo 1. The net is being lowered.

AIR BOSS Roger.

PHOTO 1 This is Photo 1. The net is at the raft The first astronaut is climbing into the net, and the first astronaut is in the net on the way up clear of the command module. The first astronaut is half way up. The first astronaut is at the hatch.

AIR BOSS Roger.

PHOTO 1 The first astronaut is in the helicopter, the net is on its way down.

AIR BOSS Roger.

PHOTO 1 Recovery 1 is commencing his second approach. The net is at the raft, the second astronaut is in the net and is on his way up clear of the command module.

AIR BOSS Roger.

PHOTO 1 The net is at the hatch. The second astronaut is in the helicopter.

AIR BOSS Roger.

PHOTO 1 The net is on its way down, Recovery 1 is making a third approach.

AIR BOSS Roger.

PHOTO 1 The net is at the raft, in, the third astronaut is climbing in the net, the third astronaut is in the net and on his way up clear of the command module. The third astronaut is half way up. The third astronaut is in the hatch, he is climbing in the helicopter.

AIR BOSS Roger.

PHOTO 1 All three astronauts are aboard.

AIR BOSS Roger, Photo 1.

PHOTO 1 Roger, this is Photo 1. We have hatch on the Recovery 1 is closed.

RECOVERY 1 This is Recovery 1. I have 3 astronauts aboard switching power frequency, power frequency.

AIR BOSS Roger (garbled)

SWIM 2 This is Swim 2 along side the command module. The BIG swimmer decontaminating the module

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SWIM 2 at this time the 3 swimmers are in the raft (garbled)

PAO Mission Director George Hage has just thanked the flight controllers assembled here in the Control Center on behalf of himself and Gen. Phillips for the way in which they conducted this mission.

AIR BOSS Stand by Swim 1 and 3. This is Air Boss. I haven't seen any more of the 2 drogue chutes nor the apex chute.

PAO No cigars being lit up here yet. We're waiting until the crew is on the carrier. A few are being wetted in anticipation of a match, but we don't see any lit yet.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 12:55, GET 196:23, 577/1

PAO The elevator will take recovery 1 down to the hangar deck and where the crew will enter the mobile quarantine facility. And the flags are waving and the cigars are being lit up. And clear across the big board in front is President John F. Kennedy's message to Congress of May, 1961: I believe that this Nation should commit itself to achieving the goal before this decade is out of landing a man on the moon and returning him safely to Earth. That has been accomplished.

PAO The Apollo 11 placque has been hung in the mission control center - a replica of the crew patch.

PAO This control center becoming jammed with people as - people from the staff support room is coming in here. We've never seen this many people in the control center at one time before.

END OF TAPE

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NOT TRANSCRIBED - COMMERCIAL TV

APOLLO 11 MISSION COMMENTARY, 7-24-69, CDT 13:17 579/1

NOT TRANSCRIBED - COMMERCIAL TV

## NOT TRANSCRIBED - COMMERCIAL TV

PRESIDENT'S MESSAGE, 7/24/69, CDT:

581/1

SPEAKER President Nixon waving to the astronauts. The curtains have been drawn. There they are in the rear window. President is receiving applause from the crowd. Astronauts gather in the window.

NIXON Neil, Buzz, and Mike. I want you to know that I think I'm luckiest man in the world. And I say this not only because I have the honor to be President of the United States, but particularly because I have the privilege of speaking for so many in welcoming you back to earth. I could tell you about all the messages we received in Washington. Over one hundred foreign governments, Emperors, and Presidents and Prime Ministers and Kings have sent the most warm messages that we have ever received. They represent over 2 billion people on this earth. All of them who have had the opportunity through television to see what you have done. And then I also bring you messages from members of the Cabinet and members of the Senate and members of the House and Space Agency. And in the streets of San Francisco where people stopped me a few days ago, and you all love that city, I know, as I do. But most important, I had a telephone call yesterday. The toll wasn't, incidently, as great as the one I made to you fellows on the moon. (Laughter) I made that collect, just in case you didn't know. But I called the three of, in my view, three of the greatest ladies and most courageous ladies in the whole world today, your wives. And from Jan and Joan and Pat, I bring their love and their congratulations. We think that it is just wonderful that they could have participated at least through television in this return; we're only sorry they couldn't be here. And also, I've got to let you in on a little secret - I made a date with them. (Laughter) I invited them to dinner on the thirteenth of August, right after you come out of quarantine. It will be a State dinner held in Los Angeles. The governors of all the 50 States will be there, the ambassardors, others from around the world and in America. And they told me that you would come too. And all I want to know - will you come? We want to honor you then.

ARMSTRONG We'll do anything you say, Mr. President. Just anything.

NIXON One question, I think, all of us would like to ask. As we say you bouncing around in that boat out there, I wonder if that wasn't the hardest part of the journey. Was that - did any of you get seasick?

ARMSTRONG No, we didn't. And it was one of the harder parts, but it was one of the most pleasant, we can assure you.

NIXON Yes, well, I just know that you can sense what we all sense. When you get back now - incidently,

have you been able to follow some of the things that happen when you've gone. Did you know about the All-Star game?

ARMSTRONG Yes, sir. The Capsule Communicators

have been giving us daily news stories.

COLLINS They daily post us.

NIXON Were you American League or National League?

ARMSTRONG I'm National League man.

ALDRIN I'm nonpartison, sir.

COLLINS That's right.

NIXON There's the politician in the group, right.

ARMSTRONG We're sorry you missed that game.

NIXON Yes, well - you knew that too.

ARMSTRONG We hear that -

NIXON The rain -

ARMSTRONG The rain. Well, we haven't been able to control the weather yet, but that's something we can look forward to as tomorrow's challenge.

NIXON Right, right. Well, I can only summarize it because I don't want to hold you now. You have so much more to do. And gee, you look great; do you feel as good as you look?

ARMSTRONG Oh, we feel just perfectly, Mr. President.

NIXON Yeah, I understand your - Frank Borman says you're a little younger by reason of having gone into space, is that right. Do you feel that way, a little younger?

COLLINS We're a lot younger than Frank Borman. (Laughter).

NIXON There he is, over there. Come on over Frank so they can see you. You going to take that lying down?

ALDRIN It looks like he has aged in the last couple of days.

NIXON Come on Frank.

BORMAN Mr. President, the one thing I wanted. You know we have a poet in Mike Collins and he really gave me a hard time for describing new words of fantastic and beautiful. And you - and counted them, in three minutes up there you used four fantastics and two beautifuls. (Laughter).

NIXON Well, just let me close off with this one thing. I was thinking as you know, as you came down and we knew it was a success, and it had only been eight days, just a week, a long week. But this is the greatest week in the history of the world since the creation. Because as a result of what happened in this week, the world is bigger infinitely, and also as I'm going to find on this trip around the world and as Secretary Rogers will find as he covers the other countries and Asia. As a result of what you've done the world's never been closer together before. And we just thank you for that. And I only hope that all of us in government,

all of us in America that as a result of what you've done, we can do our job a little better. We can reach for the stars just as you have reached so far for the stars. We don't want to hold you any longer. Anybody have a last re- How about promotions, do you think we could arrange something? (Laughter)

ARMSTRONG We're just pleased to be back and very honored that you were so kind as to come out here and welcome us back, and we look forward to getting out of this quarantine -

COLLINS Great.

ARMSTRONG - and talking without having glass between us.

NIXON And incidently, the speeches that you have to make at this dinner can be very short. And if you want to say fantastic or beautiful, that's all right with us. Don't try to think of any new adjectives; they've all been said. And now, I think incidently, that all of us who - the millions that are seeing us on television now, are seeing you, would feel as I do that in a sense our prayers have been answered, and I think it would be very appropriate if Chaplain Pierto, the Chaplain of this ship were to offer a prayer of thanksgiving. If he would step up now. Chaplain, thank you.

CHAPLAIN Let us pray. Lord, God, our Heavenly Father. Our minds are staggered and our spirit exalted with the magnitude and precision of this entire Apollo 11 mission. We have spent the past week in communal anxiety and hope as our astronauts sped through the glories and dangers of the heavens. As we try to understand and analyze the scope of this achievement for human life, our reason is overwhelmed with abounding gratitude and joy, even as we realize the increasing challenges of the future. This magnificent event illustrates anew what man can accomplish when purpose is firm and intent corporate. A man on the moon was promised in this decade. And though, some were unconvinced, the reality is with us this morning, in the persons of Astronauts Armstrong, Aldrin, and Collins. We applaud their splended exploits and we pour out our thanksgiving for their safe return to us, to their families, to all mankind. From our inmost beings, we sing humble, yet exhuberant praise. May the great effort, and commitment seen in this project, Apollo, inspire our lives to move similiarly in other areas of need. May we the people by our enthusiasm and devotion and insight move to new landings in brotherhood, human concern, and mutual respect. May our country, afire with inventive leadership and backed by a committed followership, blaze new trails into all areas of human cares. See our enthusiasm and bless our joy with dedicated purpose for the many needs at hand. Link us in friendship with peoples throughout the world as we strive together to better the human condition. Grant us peace beginning

PRESIDENT'S MESSAGE, 7/24/69, CDT:

581/4

in our own hearts. And a mind atuned with good will toward  
our neighbor. All this we pray as our thanksgiving rings out  
to thee. In the name of our Lord, amen.

COLLINS                      Amen.

(play anthem)

SPEAKER                      The astronauts stood at attention.

END OF TAPE

APOLLO 11 MISSION COMMENTARY, 7/24/69, CDT 2:10, 582/1

PAO                      This is Apollo Control. The participants  
in the post-recovery news conference have left the control  
center, and the post-recovery news conference will begin  
within the next few minutes in the MSC building 1 auditorium.

END OF TAPE